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LAST WORDS ON MATERIALISM.



Herrn Dr. L. Büchner.

LAST WORDS

ON

MATERIALISM

AND KINDRED SUBJECTS.

BY
PROFESSOR LUDWIG BÜCHNER, M.D.
(Author of "Force and Matter").

WITH A LIFE OF THE AUTHOR BY HIS BROTHER PROF. ALEX BÜCHNER.

TRANSLATED BY JOSEPH McCABE.

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TRANSLATOR'S PREFACE.

THERE has been so widespread an interest in the translation of Dr. Haeckel's *Riddle of the Universe*, published by the Rationalist Press Association last year, that it has been decided to introduce to English readers the last work of his distinguished colleague, the author of *Force and Matter*. After his death it was found that Dr. Büchner had selected a number of the occasional papers he had written between 1891 and 1899 for publication under the fitting title of *In the Service of Truth*. From these I have selected for translation the essays of universal and more enduring interest. No man had juster claim to the title Dr. Büchner suggested ; but he is best known to English readers as the author of *Force and Matter*, and the following papers are most correctly described as a continuance and manifold application of the controversy that famous book aroused. Materialism is the title his opponents insist on giving to his views ;

Monism is his own, and the correct, appellation. And in these papers we find him defending his system, and studying its every facet and extension, with his well-known erudition, versatility of mind, and force of literary expression. The date of the publication of each paper is indicated in the table of contents.

September, 1901.

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INTRODUCTION.

THE LIFE OF LUDWIG BÜCHNER.

As I am the last surviving member of our generation of the family, I have been requested to give from my recollections a sketch of the life of my late brother Ludwig. Only three years younger than he, I spent my childhood and early youth in his constant companionship; nor were we separated in our University career and the later years of struggle and conflict. Hence these pages will be devoted chiefly to a record of internal development and to the family life. The external events of his life offer no peculiar interest, and do not therefore call for special description.

In our native town, Darmstadt, my father was a *novus homo*—he did not belong to any of the old families of State officials which made up the population. He came from Reinheim, a small town that lay about three hours' journey to the east of Darmstadt, and was the son of an army surgeon with a large family. Travelling is a natural instinct of the people of that district, and so, about the middle of the eighteenth century, a second branch of the Büchner family went to Holland; I remember seeing its latest arrival when political exile drove me to that country in 1849. This was at the house of an uncle who had similarly migrated to Holland in his youth,

and made a name and a very fair competence there as a physician. My father followed his example, joined him at Gouda, and immediately entered the newly-organised army of King Louis Napoleon as a military surgeon. This was shortly before the time when the first emperor decreed the incorporation of Holland in the great French Empire. The Dutch troops were then in the vicinity of Paris, and the Emperor reviewed them one day at Versailles. He noticed my father, and spoke a few words to him, as he was in the habit of doing with the troops. "You ride well; how old are you?" he asked, and passed on.

This incident, common enough and trivial in itself, was a red-letter day in the life of the young man, as it was for so many others who came under the magnetic influence of the Emperor's personality. Years afterwards, when my father was at home again, we often heard him speak with pride of that day at Versailles.

Little, strong, and of robust build, as he was, he imagined he had a certain resemblance to his hero, though that did not interfere with his loyalty to his master at that time, the Grand Duke of Hesse. But the shade of the Emperor haunted him. One evening, when the Grand Duke was giving one of the masked balls which were familiar at that time, there appeared at it a man of short stature in the green uniform which the Emperor usually wore. The mask caused great excitement, and was addressed from every side; he remained as silent as the grave, walking solemnly up and down the room with his hands behind his back. When the clock struck twelve, and the masks had to be taken off, he had disappeared. My father

had obtained permission for this performance from the obliging authorities.

At a later date the old man was deeply gratified when he heard that his youngest son had entered the service of France. He had a fine new suit of clothes made for me, with the remark: "We shall show them that we know how to make decent clothing in the country here." In my youthful vanity I added, "And to wear them."

When he left the Grand Army my father, thanks to his savings, was able to remain some time in Paris and study its hospitals. Moreover, he had taken part during the campaign in a number of operations, which are so useful and instructive to the young doctor, if not to the patient. He then returned to his country, took a medical degree at Giessen, and joined the staff of the asylum at Hofheim. He immediately attracted the notice of many of the higher officials—among other, of Governor Reuss, whose daughter, Caroline, he married. After that he lived at Darmstadt, where he remained as a physician with a good practice and a member of the Medical College, of which he was President at one time, until his death at an advanced age in 1862.

His marriage with the daughter of a high official had brought him a connection with some of the first families of the town. This had, no doubt, an influence on the growth of his practice, though it was based mainly on his personal relation to his fellow townsmen, whose hearts he won by his amiable and candid disposition. There were seven children of the marriage. The eldest, George, won a reputation as a poet, through his *Death of Danton*, while he was still quite young; but he died at an early age as

a political refugee in Switzerland. The incident cast a grave shadow on the hitherto untroubled happiness of the family. My mother was a beautiful, lively, and pleasant woman ; but her cheerfulness now began gradually to fade. She belonged to a large and well-to-do family of the district, and exercised a most liberal hospitality towards friends and relatives. The house was, therefore, rarely without visitors, and the children were naturally petted and spoiled by them. Ludwig, the fifth child, was the special favourite of his mother and her lady-friends on account of his liveliness and his pretty blond curls. His portrait was painted at that time, representing him in a black coat with white lace collar, sitting on a rocking horse, and it is still in the possession of the family. At the time of his birth the family lived in the market-place, but my father afterwards removed to a house in Grafen Street. There was a large garden attached to it, which was laid out as a vineyard, and it bore plenty of fruit in good seasons. Here we spent a very happy childhood, for our garden was the rallying-point for all the children of the neighbourhood. However, we were soon overtaken by the evils of the elementary school, with its long sedentary labour in small rooms, the endless difficulties of lessons, and the learning by heart of Greek and Latin declensions and syntactical rules. Scholastic discipline was much more severe then than it is now, and there was no lack of corporeal chastisement on the part of both masters and fellow-pupils. Ludwig was a studious and industrious boy, and his interest very quickly turned to purely literary tasks. I still have a Schiller in fourteen volumes, in which Ludwig has written in pencil, at the passage where Franz rejoices at the

supposed death of his father, "Very poor." This is a relic which accompanies me in all my wanderings, and which I would not part with at any price.

The romantic days of youth had, as is usual, many a love story of the dancing-room. Then there came the time when the young student aped the dignity of his elders, with social badges and all kinds of wild adventures. Ludwig was a leader in all these things. He was held in high esteem by his comrades on account of his great ability, whilst he carefully and tactfully diverted the youthful energy from all excesses. He was scarcely eighteen when he passed, with credit, his final examination. However, he was uncertain as to his choice of profession; and, as my father wished his two youngest sons to be at the University together, he sent Ludwig for another year to the Polytechnic at Darmstadt, so as to enable me to catch up with him. In the meantime Ludwig had chosen the medical profession, although he had a predilection for philosophy. But the latter promised little "bread and butter," so the Hegelian philosophy, then in its last days, was abandoned.

Apropos of this incident, I must say a word of a remarkable but unfortunate man who then had a considerable influence on Ludwig's tendency for philosophy and literature, which might have diverted him from his study of science and its consequences. This was George Zimmermann, Ph.D., the son of a very well-to-do official family and a comrade of my brother George. He had devoted himself to teaching, and would undoubtedly have been an ornament to one of our chief schools. However, he unfortunately, through lack of resolution, remained in the elementary school, for the work of which he was not properly

qualified. Although extremely learned, intelligent, and of very varied literary and historical acquirements, Zimmermann had not the coolness and confidence which are necessary in the man who has to deal with wild and frequently malicious youths. He was also rather short-sighted, and this made it difficult for him to maintain the discipline of his class. However solid his instruction was, it lacked the warmth of that inner conviction which springs from the doubt of the teacher as to the response of the pupil. The better pupils remained indifferent, the moderate ones were alienated; and the bad ones, who formed a third of the class, took advantage of the teacher's want of firmness to play all kinds of tricks, which deprived his work of all solid fruit. Hence it was that he retreated from school to school, until at length he had to be pensioned off, and devote himself to some poor journalistic work.

At the time he was teaching at the school at Darmstadt, Ludwig was his favorite scholar, and he in turn had an appreciable influence on his master. Unfortunately, both of them had already developed that sceptical tendency which made them enthusiastic in turn for Shakespeare, Sophocles, and Goethe, and which was by no means a purely literary feeling. However stimulating this intercourse with his able master was for the ambitious pupil, it was really unwholesome, as it proved for so many gifted youths of the time, who did not realise the untenability of the post-Hegelian system, and came to grief in an eclectic vacillation between the most divergent schools. Still, I willingly speak here of this most deserving man, to whom Ludwig owed so much of the literary manner of his works, on account of his invariable good taste.

The wreck of this learned æsthetic was frightful to contemplate.

Ludwig went, therefore, to the University of Giessen, but he had only been there a year when his father's predilection for France reasserted itself. With the intention of providing us with a knowledge of languages as a resource in emergencies he sent his son for a year to Strassburg, where he had relatives on the mother's side in the family of the distinguished Biblical student, Professor Reuss. But the earlier glory of this University had departed under the prosaic authority of the monarchy; and Ludwig, perhaps touched with home-sickness, soon returned to Darmstadt, and the following year accompanied me to the University of Giessen once more. At that time Giessen was a dirty little town of scarcely more than 7,000 inhabitants; it had about 500 students, who, to pass the time, drank and fought rather above the average. The one light that illumined this wilderness was that of the great chemist Liebig, who, in gratitude to the Grand Duke of Hesse, who had facilitated his studies, would not abandon the University. The growing fame of the creator of organic chemistry brought to the place a number of foreigners, generally men of means, from France, England, Switzerland, and America, and gave it a cosmopolitan air. We used to call these chemists "poison-mixers." At their experiments they generally wore glass masks, though this did not save the master from losing an eye one day through an explosion. When an accident of that kind occurred, he used to turn round and coolly throw the rubbish behind him; but he was not uniformly successful in this. In dread of these incidents the Philistines of

Giessen declined to have the "poison-mixers" in their houses, and so they had to gather in isolated residences, such as houses with large gardens, where they could blow themselves up without attracting the attention of their fellow men. We other students, especially in law, passed our time unconcernedly at the tavern or on the duelling-ground; learning as little as we possibly could, but always getting through our examinations successfully. The medical students were more zealous for their science. They had, however, little working material; and whenever a corpse was brought to the anatomical school there was a great struggle to get a leg or an arm or some other member, in order to prepare it properly. Sometimes they forgot the dinner-hour over their work, and many a one made use of a hastily-wiped scalpel at his improvised meal of bread and cheese. Ludwig was one of the most industrious; still he found time to take part in the reform movements of a number of earnest students of the time, who opposed themselves to the abuses of the club, and so earned the title of "the grumblers." Ludwig had great natural gifts for speaking, and soon became one of the leaders of the new students' society, the "Alemannia." Unfortunately, the thing fell to pieces before long; the Alemannia gradually split into sections, and these eventually differed very little from the original society.

Then came the year 1848 and the February Revolution at Paris, which inflamed the whole of Germany, and especially the Universities. Our family had hitherto been very loyal, but we younger folk had the tradition of our brother George, the fugitive demagogue. In a state with the patriarchal and

optimistic government of Darm-Hesse these dreams were held to be innocent and harmless, although a number of young people were kept under supervision by the authorities for several years. Hence the demagogic activity of our eldest brother did little damage to the position of the family, related, as it was, to so many officials of the State. But we young men were enthusiastic, and declared ourselves republicans, after the success of the Parisians. A friend of George's, named August Becker, had returned to his home in Giessen in consequence of these events. This Becker, a man with a terrible red beard and a stentorian voice, had set up as a demagogue, and we youngsters soon began to follow his evil example. He also published a democratic journal, *The Last Day*, which aroused great interest amongst the country people, who understood the title to refer to "the day of judgment." We wrote fiery articles in this journal, and delivered speeches at the popular meetings which were being held in support of the candidature of Karl Vogt for the Frankfort Parliament. Ludwig went with Becker to the opening of Parliament at Frankfort, and from there they sent reports of the sittings, which I had printed in *The Last Day*.

At the same time we organised a volunteer corps, armed with old sporting rifles and pikes, which was divided into companies. The company for our quarter was called "The company of the gate," and Ludwig was chosen as officer. He drilled us very imperfectly, as his military knowledge was extremely limited. One day, whilst we were marching with a wall on our left, the order suddenly rang out, "Left wheel, march." We did not exactly run into the wall, but stood before it like cows on the hill-side, and

burst into a roar of laughter. We had the intention, at least.

Our activity attracted a good deal of unpleasant attention in the town and the capital, and a number of fulminatory letters went to and fro, which, however, failed to influence us. In the meantime the examinations came round, and we both obtained our doctorate in the summer of 1848, at little distance from each other on the list; that somewhat moderated the concern of our good parents. In September Ludwig returned home by way of Frankfort. He incurred no slight danger in doing so, for he took with him, at his departure on the eighteenth of September, an old sporting rifle, and fell in with the Austrian troops at Frankfort. He ran the risk of being arrested as an armed revolutionary, but he luckily escaped by taking refuge in the house of his cousin Becker, minister at the Nickolaikirche. The next day he made his way to Darmstadt, leaving his murderous weapon with the pastor.

From that day the family-life was resumed, and Ludwig, who immediately passed the official examination with brilliant success, gradually acquainted himself with the extensive practice of his ageing father. It is true that he was regarded with some suspicion in those evil days as a dangerous agitator, but this gradually wore off. He never asked anything of the State, and even in the later days of his fame never received anything, with the exception of a diploma, which went by the name of "the inevitable," in connection with his medical work in the war of 1870.

His personal characteristics now began to display themselves more and more clearly. Ludwig was

essentially an emotional man ; in that he recalled the infinite kindliness and gentleness of his mother rather than the strength of the father. He was a born optimist, although a medical man ; and this characteristic remained very appreciable throughout his whole life, and led him into a series of internal difficulties and much vacillation, which often made him very unhappy. At such times he naturally found most consolation in what we call the weaker sex—in those sympathetic souls with whom he was brought into contact by domestic relations or through his medical practice. Under such circumstances were spent the fifteen troubled years, during which he failed to reach a consciousness of his literary gifts and vocation. He might have vegetated for the whole of his life in a small town, had not an external event delivered him from the sleepy atmosphere of Hesse-Darmstadt. He had won some repute by his contributions to a legal and medical periodical, besides having passed a very creditable examination, when he one day received an invitation to the post of assistant physician, with the right of teaching, at the University Hospital at Tübingen. This was a step on the way to a University professorship. It was a small beginning—free residence at the hospital and a salary of 400 florins (!)—but it was the first step of the ladder ; in addition he was very successful in his practice and teaching.

Nevertheless, one could read between the lines of his letters a continual discontent and uncertainty, and it was clear that he felt completely isolated in that Swabian atmosphere. His mother now came forward with a plan for the relief of her favourite, and it fell to me to pay the bill, which indeed I gladly did.

“Here,” she said, “we have Alex back from his travels. How would it be if he went to Tübingen with Ludwig?” No sooner said than done. The annual scientific congress was to take place at Tübingen that year. Ludwig had undertaken a couple of journalistic engagements in connection with it. I undertook one for the *National Zeitung*, of Berlin, and gaily embarked on the sea of science. We had a pleasant week of formal speeches and hotel conversation, as well as excursions and balls. At the latter Ludwig was thawed somewhat in the company of a number of pretty Swabians from Stuttgart, with whom we maintained a correspondence for a long time. I remained there, living sometimes in Stuttgart and sometimes in Tübingen, and faithfully discharged my duty of enlivening my thoughtful brother. I was greatly assisted in the work by a young Frankfort student, the botanist De Bary, who was then a private tutor at Tübingen, and died sometime ago as rector of Strassburg University. He was no less lively than myself, and a good walker to boot. He had a nice little dog of the name of “Pitt,” which, together with a rat-catcher who was attached to the hospital, always accompanied us on our rambles in the fine surrounding country. Our comfortable Ludwig, who was already developing the rotundity of his later years, used to fall out, and we would pick him up on our return at the “critical points”—the taverns—over a glass of “cool beer.” One of our favourite resorts was a tavern on the way to Rottenburg, where they had excellent beer. We often met there the last straggler of the Strauss school, Schwegeler, an extraordinary professor, who was rather in disfavour on account of his anti-theological opinions. He used to like coming

with us young fellows, because with us one had not to balance one's words so nicely.

In this way we spent two very pleasant years, which were only overcast by a certain financial restriction. In the meantime my elder sister Louise and myself had made some literary experiments, and we awaited the decision of Ludwig as the genius of the family. He kept as silent as the grave. One morning, however, he came into my room with a great bundle of papers under his arm, and told me that he also had made an experiment in the art of spoiling paper. "Oh," said I; "is the family disease breaking out in you? It was quite time! What is that stuff you have under your arm? Is it an historical novel after Alexander Dumas and Eugène Sue, or a blood-and-thunder drama *à la* Victor Hugo?" I did not expect anything else from him, as he had hitherto shown a decided tendency for literature.

"No," he said, "they are philosophical papers." Then, assuming quite a "dogmatic" tone, he went on:—"Things of this sort take just at present. The people are discouraged by the recent defeat of their national and liberal aspirations, and are turning with interest to the successful progress of scientific investigation, in which they see the hope of a new resistance to triumphant reaction. You have Vogt, Rotzmetzler, and Moleschott—they all find good publishers. I want you to read this manuscript, and tell me if you think I can get a publisher to accept it, and if it is likely to have any success at all."

"What is the title?" I asked.

"*Force and Matter*," he said.

"*Force and Matter*"! I cried, jumping out of my seat; "why, the title alone is worth money. Any

publisher will buy the book without looking at it. Send it off to young Meidinger at Frankfort; that is the man you want."

"You are too sanguine, as usual," he said, prudently. "Read it, and then tell me what you think."

"Very good, I will," said I, "though I can tell you now what the result will be."

So I flung aside my *History of English Literature*, and read the work through. This was soon done, as Ludwig wrote a fine hand, with few additions or corrections—a feature which he retained to the close of his life. I read *Force and Matter* without saying a word; but the very next day the manuscript was sent to Meidinger, and within a week we had a favourable reply, with the promise of a fee, which was modest enough, though it seemed to us enormous from our point of view at that time. Four weeks later the work appeared, with the well-known result. Ludwig could say with Lord Byron: "I went to sleep an ordinary man, and woke up to find myself famous." I will not go into the bitter conflict that immediately followed. Suffice it to say that the Radical Opposition made a determined stand for it; while the political and ecclesiastical reactionary parties raised a terrific outcry—as if the world would tumble to pieces if everybody believed that man consisted only of what he eat and drank! All the psychological and physiological theories that had prevailed in the world since the appearance of Christianity appeared to be utterly ruined. People seemed to forget entirely that the sceptical doctrines of the Atomists and the Stoics had ruled in the ancient world without exactly destroying it. Ludwig's

only impression at this remarkable success was one of deep astonishment. He, the poet of nature, found himself wandering in the province of materialism, which he had unwittingly entered. As he was attacked, however, he had to defend himself, and he had excellent opportunities of doing so in the prefaces to the new editions of the work, which succeeded each other rapidly. In particular, the preface to the third edition, which we wrote together, was armed like a Crusader, and our opponents then began to walk more warily in the thorny path of the controversy.

The next step was taken at Tübingen. The venerable Senate of the University put their learned heads together, and found that the author of so pernicious a work could not possibly be retained as a teacher of Swabian and other youths. The faculty of private tuition was taken from him—a remarkable testimony to the so-called “freedom of teaching” in Germany. I abandoned my own idea of setting up in modern literature at Tübingen, and we returned to our home shipwrecked. From that time Ludwig began to feel more and more the antithesis of his innate idealism and his materialist philosophy. Amid the great success of his subsequent works he often told me he had missed his vocation, and declared that, if he had to begin again, he would not write his books. However, the deed was done, and he was bound to advance in the path he had entered. At first Ludwig resumed his medical practice, though it cost him an effort, he said, to remain at home from two to three every afternoon for the purpose of feeling the pulse of the first yokel that came along. He then worked in secret at his

favourite occupation, and we have a striking outcome of it in his *New Hamlet: Prose and Poetry from the Papers of a Deceased Pessimist* (which appeared under the pseudonym of "Karl Ludwig"). It had been prepared some time, but only appeared in 1885 at Zürich. In the preface the author declares—fictitiously, of course—that he has long had in his possession the following papers, which were the youthful production of a deceased writer. He justifies the title of *Hamlet* by giving the names of the great thinkers of every nation: Solomon, Job, the Prophets, Buddha, Homer, Socrates, Sophocles, Shakespeare, Goethe, Byron, Platen, Heine, Lenau, Puschkin, Beethoven, Schumann, Schopenhauer, and Leopardi—all of whom were the poets of the world-old pain that breathes through universal literature. Hamlet is the type that most perfectly represents this world-pain, and the author of these papers he is publishing approaches him in his inward doubt and the non-fulfilment of his fine resolutions, the causes of Hamlet's death. It is quite clear that he identifies himself with the hero whose fortune he is following. I found, to my great astonishment, how little attention Ludwig paid to the literary-historical aspect of the famous English poet and his works while he was engaged in this composition. There was a discussion on at the time whether Shakespeare was not a pseudonym for the real author of the dramas, and whether this was not Lord Bacon. I had been drawn into the controversy, and had written a paper in which I thought I had proved the untenability of the theory. I was anxious to know Ludwig's opinion on the question. To my surprise, he regarded it as a trivial dispute between loquacious pedants; the

main point was that the works existed at all. They had an intrinsic worth and interest, whether Shakespeare, or Bacon, or anybody else, had written them. We did not pursue the question. On further reflection I was convinced that he was right—that one can admire and enjoy a beautiful park, for instance, without knowing the name of the gardener who designed it.

When we come to regard the contents of the *New Hamlet* we find a vindication of this opinion; on account of the pseudonym the book was hardly noticed, whereas it would have attracted considerable attention if the author had given his real name. Why did he conceal his identity? Probably from a feeling that his numerous and bitter opponents would have fallen furiously upon him if he had written in a new vein, and that quite opposed to the former one; possibly, also, it was his customary vacillation between resolution and performance—in other words, the Hamlet element in him—which prevented him.

As to the contents of the *New Hamlet*, it consists, firstly, of about sixty lyrics of unequal value and with very different subjects; they are more distinguished for depth of thought than poetic inspiration, but they are very elaborate and polished in structure. The dramatic pieces are more important; they clearly belong to my brother's younger days, and they have the familiar character of irresolution. There are three tragic pieces—*Cromwell*, *Rosamund*, and *Andrea Castagno*. The fact that all these remain incomplete shows of itself that he felt a want of harmony with this kind of work; the Hamlet element is again appreciable. However, in themselves these hasty sketches reveal a high dramatic ability. Further on we have

a death scene, three monologues, and the poems *Resolution* and *At the Bier of a Suicide*; all of these have the same expression of painful doubt and personal indecision. One can scarcely believe that the clear and self-conscious scientist is identical with the *New Hamlet*. We might take the great question, "To be or not to be?" as a motto for the whole of this side of Ludwig's literary activity. The finest part is *The Leaves from a Diary*, which form a kind of confession. Let me give one illustration: "We are like dogs on a treadmill; the red-hot irons of life goad us to unceasing action on the ever-turning yet motionless wheel, to a restless and aimless advance, until at length we sink exhausted into the grave we have dug."

Finally, the passages *Macbeth*, *Cola di Rienzi*, *Life a Dream*, and *A Story of Love* are obviously youthful works of great ability; they seem far removed from the materialist writer of later years. The pieces on *University Reform* and *Academic Jurisdiction* clearly expose the defects of our present University arrangements. The work closes with an autobiography, unfortunately unfinished, in which we recognise the impressions of our early years, as may be seen from the following extract:—

"Thus, in my eleventh year, in all the buoyant hopefulness of youth, I entered the school of my native town, in which a new horizon opened out to me. The intense mental life that surrounded me spurred me on to increased activity, the strong human stream bearing me along with it, so that a fortnight usually flew swiftly and merrily along before the dreaded day on which my father had to sign the 'conduct-book.' Once this rock was successfully cleared, youth gave the rein to its spirits once more, without a feeling of the earnestness of life. Yet this earnestness was soon impressed on me with terrible emphasis when my brother George brought care and sorrow on the family by his participation in political agitation. How

often did my father break into angry censure at table, while my mother wept beside him, and we children, understanding nothing, gazed in silence at them. And when at length, after prolonged suffering, our good parents thought they saw a gleam of happiness, death strode in between their fear and hope, and uttered his inexorable No. Who could describe the grief? Never shall I banish from my memory those awful evenings, when the letters came which brought a daily report of the fell disease, until at last the black seal of a letter told us that all was over. My father was silent and stern, my mother nigh to despair. The scenes I then lived through cast the first, but a deep and abiding, shadow on my young heart, that until then had known naught but joy."

These lines recall one of the most vivid recollections of my youth. One of our most intimate student-friends was the luckless and gifted Karl Ohly, who died a political refugee in a London asylum about the end of the 'fifties. Ohly used to call Ludwig "marasmus," because he seemed to be using himself up without reaching any definite result. Happily this prognostication was not fulfilled, in conformity with the old saying that the eternal feminine draws us forward, or, rather, in this case, provided a saving counterpoise to the tendency to sink.

Ludwig had always found great favour with the ladies, partly on account of his reputation and partly through his personal qualities, but had not yet been caught in the chain of roses. His time had now come. I had married myself in the meantime, and when he saw that it did not exactly mean instant death he decided to follow my bad example. About this time he made the acquaintance of Sophie Thomas, daughter of a Frankfort author and scholar; a lady who was greatly distinguished, not only for a singular beauty, but also for her attainments and amiable qualities. They were married at once, and the young wife proved a second providence for the

writer, with his constant sense of universal pain. She gave him a number of children, who still live and prosper, and made his home very attractive and much sought after. This materially improved Ludwig's condition, and his literary activity was greatly increased by the loving care with which his wife and handsome daughters, as they grew up, protected him from annoyance. In the course of time the daughters married—one at Darmstadt, the other at Berlin—and this gave Ludwig something of the feeling of a patriarch.

His sons also, my nephews, have not been unprosperous. George, the elder, studied philology, and adopted the profession of teaching. A marriage connection, however, drew him into the industrial world, and he is now at the head of a large iron foundry and engineering works. The second, the Benjamin of the family, named Willy, a lively young colt, has had a successful military career, for which he was well suited. He also married, and is now first lieutenant of a Schleswig regiment.

The events of my brother's life up to this time are confined to an extensive literary activity. In 1874, at the invitation of the German-American Gymnastic Association, he made a tour in the United States; when, amongst other old friends, he visited Emil Praetorius, then editor of the *Western Post* at St. Louis. The profits of this tour formed the basis of his moderate means. On his return he paid me a visit at Caen, by way of Havre. He thus made the acquaintance of the leading professors of our venerable University, who held him in high regard, and surprised them by the ease with which he expressed himself in French, and rebutted the arguments of

scholars who had spent their lives in the school of Causin. He had a great command of French. When *Force and Matter* was first translated into French I had no time to supervise the translation. It was therefore left to the care of one who was supposed to be expert, but he did the work so badly that it had to be greatly improved in the second edition. In the translation of his subsequent works we often worked together during my holiday visits to Darmstadt, and I found that little or no correction was needed in the French text he had suggested. When he came to Paris in 1886, at the invitation of the *comité des fêtes*, for the unveiling of the statue of Diderot, he delivered a speech in French on the Boulevard St. Germain in which even the dainty Parisians found no fault, beyond the inevitable German accent. He had not so good a knowledge of English, but he knew it well enough for conversation on visits to English scientists, such as Lyell and Darwin.

To convey a general impression of my brother I must recall—with a due sense of proportion—the youthful Schiller as the author of *The Robbers*. Our fellow-students used to picture him with great riding-boots and spurs, and a whip in his hand; whereas the military physician, especially in mufti, was quite a different personage. Ludwig was, in his early years, a comfortable little man inclined to stoutness, with an exceptionally strong head (for which he was nicknamed “Head”), a thin light beard, a round open face, and blue eyes, through which the physician inspired confidence. In the latter capacity he was particularly skilful at diagnosis, never making a mistake, confident and decisive. But he lacked the indispensable care and patience of a physician, to

hear the endless description of the patients' maladies, and give exhaustive directions as to the taking of the medicine and its effect. This gave him a disadvantage beside rivals who could enter more into the ways of patients. Nevertheless, he quickly and easily secured his father's practice, and his high reputation also brought him many strangers, who began to be numerous in Darmstadt at that time.

In the home he liked to be quiet ; he was hospitable with strangers, but did not like to be disturbed at his work. He spent little time at the tavern, except when his duties as president of the Gymnastic Association took him thither ; he was fond of walks and excursions in the pretty country round the town. By temperament he was quiet, cool, free from outbreaks of passion ; hence he was often called in to arbitrate in public disputes, such as the famous Lasalle affair, even in the neighbouring towns, like Darmstadt. He was very temperate in controversy, so as to win even the respect of his opponents. His public discourses were well thought out, clear, and supported by notes, at which he glanced now and again. As a rule, he was rather silent and observant than active. But whenever a thing interested him he entered into the conversation with his usual logical acuteness, and generally convinced his opponents, if they were fair and candid. Externally one could see very little of the inner conflict which I have often mentioned ; it became all the more perceptible during his studies at home, when his worthy spouse would charm away the evil spirits with her pleasant and lively disposition.

A certain modern school of scientific criticism, with a pretension to superiority, affects to regard with disdain the first results of German materialism, and

especially that of my brother. In truth, Ludwig can scarcely be given all the credit for the astonishing results of the advance of science. But what made those achievements possible if it was not the impulse which he gave? The men who find themselves to-day in so lofty a position should have some appreciation of the labours of those who discovered and levelled the path that led through the swamps to the foot of the mountain. There are few with us to-day who can recall that period of gloomy depression and uncomplaining despair which succeeded the overthrow of all national aspiration and effort at unity in 1848 and 1849. In those days one needed an iron courage to raise one's voice in defence of free investigation. What did the world at large know then of the first achievements of science? The vast majority were sunk in their blind faith in authority and the Bible. They knew nothing of metabolism, nothing of the transfer of physical forces from one body to another, nothing of comparative anatomy, or of anthropology, or of the discovery of the fossil remains of earlier animals; they did not wish to know, because such things clearly contradicted the pleasant legends of the Bible, whose naive story of creation led to little reflection. Into this frog-pond was suddenly flung the log of *Force and Matter*. No wonder there was a universal croak. The moment was favourable for the appearance of such a work, and this partly explains its remarkable success. But to infer from this that it had no intrinsic value is as foolish as to depreciate the inventor of the first locomotive in view of the magnificent machines that fly from town to town to-day. What would these learned critics of the new materialism say if the thinkers and pioneers of the

years to come were to look back on their own efforts with the same disdain? It was with these thoughts that Ludwig was consoled by his friends when he was discouraged to find the new generation outstripping him, or fancying it outstripped him. "History repeats itself," I used to say to him at such times; from the days of Thales and Pythagoras all human thought has revolved about that centre. Each philosopher, standing on the shoulders of his predecessor, points out how much the greater he is. But the unquenchable and idealist optimism, with which my brother was so richly endowed, pervaded his writings more and more with the advance of age. As if trying to outdo the theologian with his promises of sugar plums, he predicted a better future here on earth for advancing science. The fact that this future lay in the almost invisible distance did not distress him, when he thought of the thousands of years it has taken our planet to develop, and still await it before it will reach the desired, and indeed very hypothetical, goal. Whether this trust be well founded or no, it is at least natural and legitimate in view of the prizes which his opponents so generously offered to their followers. *Qui vivra verra.*

If, in conclusion, we glance briefly at the condition of the men who had won fame in Germany and France at that time as poets and writers, we do not find the comparison very creditable to Germany. Men like Michelet, Quinet, Victor Hugo, Jules Simon, and so many others, had by the bold flight of their imagination, their brilliant style, logical reasoning, and captivating utterance, penetrated into every stratum of society, and thus obtained a weighty influence in the State. The doors of the Academy were opened to

them ; even their opponents recognised their merit, if it were only from patriotic feeling, when a man's fame had sped beyond the national frontiers. Honours and wealth were showered on them. But the German writer, if not a professional man, had indeed some recognition, but was disregarded as such by the State and the heads of society. A young friend of mine, whose name I have good reason to reserve, once drew my attention to the fact that in the famous Bronze group of Frederick II. the intellectual giants of that time—such as Kant—had a very modest position in the train ; whilst literary and military men were always to the fore. If my brother had belonged to France, and had won his success in that country, he would have been distinguished in the State like the men I have mentioned. Honour is forced on you in France ; in Germany it is a *privilegium odiosum*, which makes its possessor, if he have not the discretion of Hegel, Humboldt, or Ranke, contemptible at the Court of Berlin, and almost puts him outside the pale of the law. So it happened in the case of my brother, who was well qualified and willing to take his part in the political life, had he been permitted. It is true he was elected to the Landtag of Hesse-Darmstadt. But what did that amount to in the then political condition of Germany ? His place was in the Reichstag, instead of so many of those silent and obsequious members who have the time and money to beg and secure seats. “ I have to write and to practise,” he often said, “ in order to live. How can I find the means for the costs of an election and a long stay in Berlin ? I must go on with my ploughing, and leave it to others to guard the political interests of the people as they think best.” Here we have another

illustration of what is called the sound sense of the Germans; it left one of its talented leaders in the shade, and spent its money on high officials and financial operations. Whether or no the great promises he held out to the German nation in his later writings are ever fulfilled, he at all events has not lived to see the fruit of his devoted labours.

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LAST WORDS ON MATERIALISM.

WHAT IS MATTER?

IT is a notorious fact that there is frequently a wide gulf between the term with which we express a certain idea and the idea itself. The word may have been grounded originally on a very secondary feature, through which the object designated chanced to reach our senses or our intelligence; whereas the closer acquaintance which we acquire in the course of time may give rise to a series of presentations, closely connected with the object, but alien to our original conception of it. For instance, when we evoke the mental image of the "cuckoo," we do not merely think of the peculiar cry which attracted that name to the bird; we have a very definite and complex idea, composed of a number of presentations, of a living thing with certain features and peculiarities. So it is with the idea of a "stone." To the uneducated a stone is merely a hard body of a certain appearance, shape, weight, colour, and so on. But what a multitude of images the same word may evoke in the mind of a geologist or a mineralogist. He regards not only its manifold chemical and physical properties, but also, perhaps, its intimate connection with the whole history of our planet. Take, again,

the idea of a "star." The uneducated, probably, conceive it only as a brilliant point of golden light in the vault of heaven, whose duty it is to relieve the darkness of our night. Compare with this the image which the word evokes in the mind of the astronomer, and the profound conception it inspires in him of the innumerable bodies of the heavens.

We have a parallel to these instances in the case of the idea of "matter," which was originally extremely slender and superficial. Very little was involved in it beyond purely external qualities, such as colour, shape, weight, hardness or softness, and so forth. How enormously this idea has been extended and completed by the progress of science in the course of the last century! It is not long since it was thought impossible for matter to assume a gaseous and invisible form. Even more recently the ether which pervades the universe was wholly excluded from the idea of matter, because its properties were deemed incompatible with the narrow conception that had been formed of it, as something essentially tangible and visible. In like manner, we no longer restrict the idea of the universe to our earth, the sun, the planets, and the stars, but we enlarge it until it embraces everything that floats in the vast ocean of ether. The same scientific research that has taught us the illimitable extent of matter has also given us quite a new and profounder knowledge of its properties. We now know that it has chemical, physical, and electro-magnetic qualities which were undreamed of a few decades ago. But how arduous a task it has been to deliver people from the obsession of the antiquated notion of matter, as something inert and dead, in order to perceive this. Light was held to be

a stream of radiating particles: now we conceive it as an undulatory movement of that ether to which the name of matter was refused. Heat was regarded as an immaterial (imponderable) principle that could be conveyed from body to body; we now know that it is merely a vibratory motion of the matter of which they are composed. Electricity was supposed to be a mysterious fluid, pervading matter: we now know that it also is a movement of the finest particles of matter. In a word, the innumerable properties or modes of motion which were formerly excluded from the idea of matter because they seemed incompatible with it are now not merely included in that idea, but are quite inseparable from it and essential to our conception.

And this applies with the same force to the organic world as to the inorganic. For a long time it seemed impossible or inexplicable that dead, inert atoms should produce the phenomena of life; and therefore, regarding the vital principle as immaterial, philosophers had recourse to the assumption of a peculiar force which alone had the property of producing the vital phenomena—that is, to the familiar theory of a “vital force.” To-day this *asylum ignorantie* is wholly abandoned. It is quite clear that, however specific and peculiar the phenomena of life may be, they are neither more nor less than movements of ordinary matter, under equally specific and peculiar conditions. This applies also to the highest phenomena of life, those of mind and consciousness. Misled by the earlier false and narrow conception of matter, we have contended long against the assumption that matter could, in certain conditions and combinations, give rise to the phenomena which we

call consciousness and mind; nor is the reluctance yet extinct. Nevertheless, in proportion as our conception of matter gains in breadth and depth, that reluctance is disappearing and giving way to a sounder view.

The endless objections that are continually urged against this view are entirely due to the wrong idea that has hitherto been associated with the term "matter," and to the false dualistic theory which has hitherto prevailed on this subject. If a man starts out with the idea that matter is hard, inert, devoid of intrinsic movement, and incapable of producing such phenomena as mind and consciousness, and if his conviction is solely due to the fact that he has long dissociated from his idea of matter and its possibilities all that he has been accustomed to call by other names, it is in vain to attempt to inspire him with a sounder view. But to conceive matter thus is not to regard it as something independent of himself and his ideas, but only in connection with a view which is peculiar to himself and characteristic of a low grade of mental development. To justify his conception he would have to prove that matter could not, under any circumstances, produce the phenomena we call mind and consciousness; and that is absolutely impossible. If we are to deny matter the capacity to produce mental phenomena, we may just as logically deny it the various physical, chemical, electro-magnetic, and vital phenomena which modern science has proved it to possess. We may say—in the language of Dubois-Reymond—that it is inconceivable how a flash of lightning or a ray of light can issue from the movement of the ultimate particles of matter. How can we explain why an electric current converts a piece of soft

iron into a magnet, or why a disturbance in the solar atmosphere throws all the magnetic needles on earth into vibration? Who can explain, with the aid of the old notion of matter, how we can make the human voice audible at a distance of many miles by means of the telephone? Must not such an achievement seem utterly inconceivable on material principles—a supernatural miracle—to the uncultivated mind of a savage? Such a mind must regard the simplest physical or chemical experiment as the action of an immaterial force or a mysterious spiritual influence.

At the same time, we do not affirm that consciousness and thought are themselves material. No one has ever asserted that size, colour, motion, heat, extension, hardness, softness, etc., are in themselves matter; nor do we affirm that of the mental processes. Just as the former phenomena are only produced by matter, so consciousness and thought are merely manifestations of it in a condition of extreme complexity and organisation. Life is not itself matter, but the outcome of a long series of processes which have led to the appearance of matter in its organised condition. So, too, light, heat, electricity, magnetism, etc., are not in themselves matter, but special forms of its activity. In other words, the properties or phenomena we perceive in matter are not related to what it *is*, but to what it *does*, in virtue of the harmonious action of uncounted millions of atoms and molecules. The more this complexity advances in organic bodies, the higher and more astonishing will be the resultant functions. No one will expect to find in a speck of dust the complexity and constructive force of a particle of protoplasm. In like manner, no one expects to discover mental processes in matter

which has not entered into certain combinations and assumed a certain form. The immense variation in the properties of matter, according to its complexity and the concomitant conditions, is a matter of familiar experience. Who, in the days before music was invented, and having only the simple notion of wood and metal which his experience gave him, could have dreamed of the heavenly melodies that now flood our concert-halls through the combination of these elements? Who could have conceived, before the modern advance of chemistry—especially organic chemistry—was known, that the slightest variations in the atomic combination of a few elements (or, in the case of isomeric and allotropic bodies, mere changes in the mutual position of the atoms, without altering the constituents) might induce the most profound variations in the properties of the bodies affected?

It is clear, then, that there is a vast difference between the object which we commonly call “matter” and the phenomena it is capable of producing. We cannot, therefore, say that life, consciousness, mind, etc., are matter or even material motion; we can only say that they are phenomena which are virtually or potentially contained in matter, and make their appearance when the matter reaches a certain stage of complexity and corresponding activity; and this can only be the result of prolonged and very intricate evolutionary processes. Hence we can sympathise with those who, from the standpoint of the old and antiquated idea of matter, regard with contempt the materialistic tendency of modern science, and think they are justified in talking of a gospel or a philosophy of dirt; but we cannot extend that sympathy to those

who consider that idea the expression of a crude and superannuated view, and have long since rejected it.

It is for every man to decide whether he will continue to regard "matter" as the beggar in rags it has hitherto seemed to the uncultivated mind, or whether he will recognise its true proportions and the splendid vesture of properties with which modern science has endowed it. The scientific mind of these latter days inclines to the assumption of a unified conception of the world, instead of the old dualistic theories, a faith in the simple monistic basis of all things, which remains one and the same in itself throughout all the changes and diversity of its phenomena. When that faith shall have conquered, there will be an end of the old unscientific depreciation of matter, and the world of the long misunderstood and despised materialist will be grander and nobler than any of the imaginative and artificial structures of the theologian or the philosopher.

MATERIALISM: A REJOINDER.¹

THE equivocal term "materialism" is an entirely incorrect, because much too narrow, title for the system of natural and moral philosophy which has been erected on the enormous progress of science in the last century and the great principle of evolution, and to the foundation of which my *Force and Matter* gave the first impulse. No one who is acquainted with the later editions of that work, or with my subsequent writings on the subject, would confuse this philosophy with the system that generally goes by the name of "materialism." The extreme vagueness of the term is sufficient of itself to prevent this. Naturally, I may claim to have read more anti-materialistic books and articles than most people, and my impression is that each of the authors has a different idea of his much-dreaded antagonist. On this creature of his fancy, decked out with so many shreds and patches of his own experience, he forthwith expends his utmost energy, until the last particle has disappeared. Then he affirms he has done to death the wicked materialist over and over again;

¹ The following paper is, I think, indispensable for the full exposition of Professor Büchner's thought. I have therefore included it, with some omissions, in spite of its *primâ facie* appearance of personal polemic. It is an open letter to the editor of the *Pesther Lloyd*, criticising an article of Dr. Silberstein's.—TRANSLATOR.

but by some subtle process of resurrection the materialist seems to be ever demanding his attention afresh. In such circumstances I had preferred if the expression "materialism" had been entirely avoided, as I avoid it in the titles of my own works.

A second error of my opponent is the idea that "the Büchner school," which he attacks so vigorously, ever prevailed in the course of the nineteenth century, and that the time is at hand, if it has not arrived, when its triumph will be extinguished. I was, indeed, little less than astounded to learn from my critic that I have had, in my day, a temple or a church with priestly hierarchy and a great throng of materialists about me, and that the time has come for its destruction. Of all this glory, pleasant as it may seem, I have unhappily no recollection. On the contrary, immediately after the publication of my first work my academic temple at Tübingen was destroyed, and I encountered such a cross-fire of attacks that, in the confusion of sight and hearing, I was for a time well nigh distracted. Then, gradually, I began to recover, as the discoveries of the rapidly-advancing sciences came to confirm the philosophic attitude I had taken up: spectrum analysis, a more correct knowledge of the nebulae and the movements taking place in them, general recognition of the law of the conservation of energy, the advance of atomistic and synthetic chemistry, geology, palæontology, and microscopy, the discovery of protoplasm, the discovery of fossil human remains and of the geological age of the human race, the kinetic theory of gases, the progress of neural and cerebral research, and last, but not least, the resuscitation of the theory of organic evolution in the form of Darwinism, and the recognition

of the principle of evolution on every side. Then I began to understand the anti-materialistic uproar somewhat, and to contemplate more calmly a truth that harmonised so well with experience. But, instead of being at the end of this mental process, we are really only at the beginning of it; many decades, possibly centuries, must pass before man will be able to free himself from the straitening bonds of a theological and philosophical dogmatism with all the strength of age, and reach the pure, lofty, and truly philosophic view of nature and life which is grounded on the results of positive science. If, then, it is contended that the struggle against what is called "materialism" is over, and that we may turn on our pillow to dream again the idealist-philosophic dream of earlier days, that is a serious error. The stream of anti-materialistic writings may have decreased, but it has by no means ceased to flow, and my own works are continually putting forth new editions. Only recently¹ a Munich professor has felt it necessary to lead into the field "against materialism" quite an army of spiritualist and spiritist writers with a host of popular pamphlets; setting forth in the introduction that "for more than a century (?) a system which bears the familiar name of materialism has been increasing its hold on Western civilisation," and that "what were once the finest mental powers now reel under its guidance."

Moreover, the anti-materialistic article of my critic and the excessive ardour which it breathes are of themselves excellent proof that the author, in spite of his assurance, does not regard materialism as dead, since

¹ 1891.—TRANSLATOR.

he attacks it with a bitterness which is ill-suited to an attack on a corpse. He showers violent epithets upon it, and involves himself in no slight confusion in his criticism. On the one hand he accuses materialists of dealing only with hypotheses, dogmas, and presuppositions; on the other, he complains that they admit "nothing that they cannot see, touch, weigh, and measure, and that cannot be verified by sight and touch."

How can we admit this contradiction? On the contrary, as far as the second charge is concerned, we may justly complain that it is our adversaries themselves who will not admit our theories unless they are given ocular proof of their correctness. They will not admit the birth and death of stellar systems, according to the Kant-Laplace theory, because they have no personal knowledge of it. They will admit nothing about atoms, because we cannot show them atoms under the microscope (which will never be done); although the whole of speculative science, especially chemistry, is based on the atomic theory, and cannot dispense with it. They reject the idea of a former animal ancestor of man, because he has not yet been discovered in the bowels of the earth; although he must necessarily have existed at some period, and it is a matter of indifference whether his remains are ever discovered or not. They reject spontaneous generation, because they have not yet had experimental proof of it; although no philosophic scientist can raise the slightest doubt that it once took place, and may possibly be taking place to-day. They will hear nothing of the kinetic theory of gases, because the unimaginable smallness of the molecules and the still more unimaginable swiftness of their

movement can be grasped only by thought, or by the eye of the mind, and do not come under observation, or the eye of sense. They reject the theory of evolution, asking for ocular proof of the transformation of one animal into another; although this conversion is never directly perceived, but logically inferred from innumerable facts which are susceptible of no other explanation. They ask us to show them the way in which consciousness, thought, mind, and morality are developed from the activity of the cells of the brain; although this is obviously impossible, and the discoveries of comparative anatomy and physiology, palæontology, embryology, anthropology, and ethnology leave no room for doubt as to the fact of this development.

From these instances, incomplete as they are, it is clearly incorrect to contend that *induction* is the sole instrument of scientific research and *deduction* of mental science. There is not a single science which does not need to employ both methods in order to attain its object. The whole controversy, so frequently quoted, about the advantage of either method of reasoning seems to me utterly fruitless. It is very much less a question of method than of the material that the method has to deal with. For when you have reached the stage when the empirically-given material is to be worked up in speculation, according to the law of thought, whether in the interest of philosophy or of an individual science, it is no longer possible to restrict yourself to either of the two methods. The human mind will suffer no restraining bonds, but must have access to all the methods and means which are suitable for the attainment of its purpose—that is, for research and the sounder

establishment of truth. In fact, experience itself proves that all these methods must be used in turn on every such occasion, and must be elaborately blended in every philosophic investigation; that, indeed, even the least important experiment cannot be conducted without adding a most extensive mental operation, an hypothesis, to simple experience. Induction and deduction (the latter of which not only necessarily follows upon the former, but is inconceivable without an antecedent induction), analysis and synthesis, explanation and hypothesis, experience and speculation, analogy, and abstraction, theory, criticism, and history, are all necessary in the pursuit of truth, and all find a place, according to their characters, even in philosophy, provided that attention is paid to their relation to experience, and that such methods be not employed independently of, or in opposition to, experience, on the basis of too broad and non-empirical ideas. It is clear that there is a greater risk of falling into this error in the deductive operations of the philosopher than in the inductive processes of the scientist; but it is far from clear why people should quarrel with the tendency to deduction on the part of the natural philosopher of materialistic views. Why should this process be denied us, yet granted to our opponents? What is good for one is good for the other. Nor is there any weight in the claim for a "pure deduction," which is held out as the great instrument of human thinking in the future. Such a "pure deduction"—that is to say, deduction that shall be independent of induction—can only lead to the antiquated *à priori* results of speculative philosophy.

Dr. Silberstein, unlike the vast majority of the

mathematicians themselves, considers mathematics as "a type of the most fertile and purest deductive thought," as independent of all experience, or as "a mathematic deduction transcending and preceding all experience." All these phrases must be exactly reversed. Mathematics is not a pure or *à priori* science of the mind, as Kant holds, but a purely empirical science. For the ideas of space, magnitude, extension, height, breadth, and depth are derived wholly from sense-perception, and would have been impossible without it. The bases for all mathematical operations have been obtained by way of experience. Numbers are not absolute but relative ideas, and have no reality apart from the objects they relate to; they express only the form in which objects present themselves to us, and are therefore, in themselves and without relation to objects, pure abstractions. Savage tribes are still to be found which are very defective in their names for numbers, and cannot express higher numbers at all. Some can only count two, three, and four; others to the extent of their toes and fingers. And as, in the words of my critic, "everything in the world, including sensation and thought, may be reduced to number and measure" (?), it is very mysterious where and how he is to find the invisible sources of this "pure thought."

We are now able to see what justice there is in charging materialism, or "the Büchner school," with admitting only the facts given in investigation, and regarding the modern physical sciences as a definite whole. No one has a profounder consciousness than myself of the imperfectness of our knowledge, especially in science. I know well how in this branch of knowledge one discovery, or fact, or theory,

is continually ousting another, and that we as yet perhaps know very little of all that there is to be known.

Yet this imperfection of our knowledge does not prevent us from making constant progress in the interpretation of nature and the connection of its parts, and advancing daily in the appreciation of that connection in the light of the great law of cause and effect. We have but to recall the vast scientific achievements of the nineteenth century alone. What we do know wholly suffices already to convince us with unwavering confidence of the unity and regularity of natural events or the order of nature. No fact that will ever come to light, no advance of science, can ever impair this conviction, now shared by every impartial student of nature. However much scientific material may be accumulated, it will serve only to deepen the foundation or enlarge the proportions of this structure of thought. The man who would content himself with putting together isolated facts without this fundamental and unifying thought is like a builder who is always gathering wood, stone, etc., for building a house without ever putting his hand to the construction.

The question of explanation, which my critic confuses with this fundamental principle of natural philosophy, is an entirely different matter. Nearly all the opponents of materialism devote themselves eagerly to this question, though it has been pointed out to them a hundred times that the absence of explanation is no disproof of an established fact, and that, if materialism were in a position to furnish all the explanations that are required of it, the controversy would be at an end; whilst its opponents

offer us "explanations" which are totally unworthy of the name. They are either theological myths, or arbitrary assertions, or mere descriptions, or meaningless phrases and metaphysical nonsense, or spiritistic humbug, or candid confessions of absolute ignorance.

My critic must be associated with this class when he asks us to reject the materialistic dogma "that the whole world consists of, and can be explained by, matter and force." This thesis, like the following one, that science "cannot explain the origin of matter and force," contains a twofold misunderstanding. For, in the first place, the world, or matter and force, never had an origin; they are eternal. In the second place, the philosophy of force and matter makes no pretension whatever to explain everything. On the contrary, it holds as a firm axiom that many, if not most, of the processes of nature cannot be explained in their inner connection. It cannot explain how the neural cells of the brain contrive to produce psychic or mental processes. But it is just as incompetent to explain how the electric spark contrives to cover 60,000 miles in a second; or how lightning manages to raise the bodies it strikes to so high a temperature in the millioneth part of a second, and to leave a clear image on a photographic plate in the same inconceivably small space of time; or how light succeeds in making an impression on our eye by means of at least 450,000,000,000,000 vibrations of the finest particles of ether in a second; or how the six trillion molecules in a thimblefull of gas manage to give 8,000,000,000 shocks on either side in the course of a second; or how the telephonic wire is able to make the human voice clearly audible at a

distance of several miles ; or how the tiny spermatozoa, visible only under the microscope, have the power of conveying to the offspring the bodily and mental qualities of its parents, grand-parents, and ancestors ; or how certain animals perform the most wonderful feats solely by means of their sense of smell ; and so forth.

All these and many other phenomena are, and always will be, entirely beyond our power of explanation. Yet no one seriously questions that they are facts, and facts of the natural order. So it is with the nature of the world itself ; we cannot explain it, nor can we deny its reality. If we are asked " how matter and force came to produce so magnificent and harmonious a universe," we can only shrug our shoulders in astonishment. To answer such a question one would have to be a god, or a world-spirit, or something of that kind. *How* matter and force " came to produce " it we do not know, though the question is not properly asked of those who hold the world to be eternal ; but that they have done so we know well enough. And as to the universal harmony and wondrous regularity of the world, we scientists are aware that there is really a great deal to be desired in the way of harmony, order, and beauty. Moreover, if there is a certain order and harmony in the world about us, this is due, not to *chance*, which is supposed to be the only refuge of the materialist, but to the great principle of evolution. There is no such thing as the alternative choice of " God or chance " which is always being pressed on us ; there is a third alternative, evolution, the magic word with which we solve one riddle of the universe after another. Instead of the creative interferences, which were once

thought indispensable in view of the marvellous organic inhabitants of the earth, we now have the great principle of natural development and the survival of the fittest in the struggle for existence—a principle with which are inseparably connected the names of Lamarck and Darwin in recent times, and Empedocles and Lucretius Carus in the past. Thus the condition of relative perfection, in which we now find the organic and inorganic worlds, is only the final issue of a long effort of nature, with the slightest and most imperfect of beginnings, and extending over a period of millions of years.

If we are met by the very facile retort that eternity and evolution are contradictory ideas, we reply that we and our earth and our whole solar system are but a single phase in an eternal cycle, and that this phase at least is subject to the absolute dominion of the law of development. All that lies beyond this phase in space or time may, and indeed should, be disregarded in the formation of our cosmic theory. This may be said with increased emphasis to those who hold that “outward nature is but a reflection cast by the inner mind,” and that “matter is but a mirroring of mind.” If this be so, why so much ado about the solving of world-riddles and the investigation of nature? In such case we need only study our own mind, since it includes everything. But the truth is that our critics can never sustain their idealist terminology consistently for many pages. However, we, for our part, contest no man’s right to form what system he pleases. Every man must make his own fortune, whether it be in the province of theology, philosophy, or science. But we cannot allow a charge to go forth, based on misunderstandings

and specious pretexts, against a philosophic view that has as much right to live as any other.¹

¹ It may be of advantage to append a passage from another rejoinder to a critic (Herr Säuberlich) which Professor Büchner wrote about the same time: "Rationalism, as such, has no relation to these verbal quarrels, and no claim to any particular philosophic view. Its chief business is criticism, and this both in the domain of *history* and of *science*. That does not mean, however, that the individual Rationalist is not free to adopt any philosophic system he may think fit. One thing is essential, in my opinion: it is the recognition of a natural order of things, complete in itself, and connected by the law of cause and effect, and of a scientific view which is grounded on this and on the results of science. This view may be either materialistic or spiritualistic, realistic or idealistic, monistic or dualistic; but it must be *natural*. It may vary and be perfected with the advance of science, but must never desert the standpoint of science. The breaches which exist in our knowledge of the continuity of the world will be filled up in the progress of time, and must be bridged over by reasoning where observation fails to fill them. But this has nothing to do with the ultimate ground of things, which each Rationalist may conceive as he will, if he feel constrained to do so."

THE NATURE OF THE SOUL.

IN the years 1863 and 1864 Wilhelm Wundt, the distinguished physiologist and philosopher, who now occupies the chair of philosophy at Leipsic, having resigned his chair of physiology, published two volumes of *Lectures on Human and Animal Psychology*. In these he vigorously defended the scientific—that is to say, the empirical—method against the attacks of speculative philosophy. Our ideas, he pointed out, can only be developed through experience, and by way of induction; there are no innate ideas in the mind—none that are independent of experience. There is no such thing as “pure thought” as the original source of abstract ideas, although the empirical origin of certain ideas is often very difficult to trace. The primitive element of all judgment and reasoning is *sensation*, which is directly related to the electric processes in the nerves. These are the forces that effect sensation. Sensation is, indeed, no more than work or movement—in accordance with the great law of the conservation of energy, whereby potential energy is converted into kinetic energy or movement. This law must apply also to the higher psychic functions. “Mechanism and logic are identical”; they are but two forms of the same thing. There is no severance of the physical and the psychical; mechanical and logical development merely correspond

to the two modes of conception which are grounded in the nature of our knowledge. The gradual evolution of the higher mental processes out of the primitive psychic element of sensation is explained under the general head of reflex action. Thought and experience, the material and the logical, the psychic and the physical, perception and existence, are one and the same thing. Without electric processes in the nerves, without the mechanism of reflex action, and so forth, we have not even self-consciousness; for this is a gradual development out of a host of antecedent processes. The ideas of time, space, and causality are not *à priori*, or innate, in the mind, but are acquired by force of experience and habit. The lucidity of consciousness is subject to extreme variations; there are such things as unconscious sensations. Animals are endowed with consciousness; there is an unbroken gradation between man and the beast in the physical and psychic relations of organisation. This gradation, regarded either way, reveals itself in the case of man in infancy and old age, when the changes in the material texture of the brain proceed *pari passu* with mental development or degeneration. The old theory of instinct is false; the psychic life of the brute must be studied on the same lines as that of man. The law of causality now holds throughout the whole field of scientific thought; there is no such thing as an uncaused event—a miracle. Yet there are still philosophers who think that in the province of mind an effect need not have a sufficient cause; that, for instance, the alleged freedom of the will is a psychic miracle. The same must be said of chance. There is neither chance, nor miracle, nor innate idea. The ideas of good and

evil must be acquired inductively before conscience can draw its deductive conclusions. Morals and moral ideas are formed in and through society; morality is entirely independent of religion or religious impressions. An innate moral law has no more reality than innate ideas. The utmost we can admit is the inheritance of bodily and mental dispositions. Speech is not a gift of God, as "the crude believer in miracles" assumes, but the outcome of a gradual and very protracted development. There is no essential distinction between the speech of man and that of the lower animals.

As to the "soul," it is just as divisible as consciousness; "and necessarily so, seeing that it is made up of a number of separate functions." On the ground of experience it is resolvable "into a collection of functions which are amenable to observation, and always associated with definite physical processes."

Ten years afterwards (1873 or 1874)—that is to say, shortly before the commencement of his philosophic career at Leipsic—Wundt published his valuable *Physiological Psychology*. In this work he adhered, on the whole, to the strongly anti-spiritualistic utterances of the earlier work; save that he laid more stress on the distinction between *external* and *internal* experience, and more space was devoted to psychology as an independent science. He still felt constrained, in describing the physiological functions of the nervous system, explicitly to declare that, "in observing the physiological mechanism [of those parts], nothing compels us to seek the aid of alien forces to intervene anywhere, as a *deus ex machina*, in the continuity of the physiological processes, or to set them in motion."

Here Wundt casts overboard entirely the old idea of the soul, which he understands by the *deus ex machina*; when, therefore, he reintroduces it in the second half of his work, where he speaks of the reciprocal action of two things, *body* and *soul*, we can only find it an unintelligible contradiction. His whole dissertation, comprehensive and informed as it is, on the physiological functions of the central parts of the nervous system, is only intelligible on the supposition that psychology merges into the physiology of the cognitive organs, and that all our psychic or mental activity is regarded as a function of these organs in virtue of their inherent potential energy; that, indeed, seems to be indicated by the very title of the work, *Physiological Psychology*. Moreover, the above views as to the character of instinct, free-will, the origin of speech, etc., reappear in the closing chapters, and in the conclusion the Kantist theory of the *à priori* character of certain forms of thought (time, space, causality, substance, etc.) is again vigorously combatted. In fine, the human soul is called, in the language of Leibnitz, “a mirror of the world,” or “a harmonious unity of many elements,” whose manifestations are bound up with the central parts of the nervous system, and it is conceded that the monistic view of psychological experience is alone correct.

The attentive reader will have already noticed that the views we have enumerated are, in the main, identical with those which, however incorrectly, are called “materialistic,” or, more properly, “monistic.” He will, therefore, be surprised to hear that Professor Wundt has nonetheless thought it necessary to devote two special chapters of these very works to an attack

on "materialism." This he can only do, of course, after putting into the mouth of the "materialist" a number of assertions which they have never made. We will not go further into this matter at present. It is enough to point out that if there is any truth in the theses we have extracted from Wundt's own works—if, that is to say, it is true "the physical and the psychic, the mechanical process and the logical, are really identical"—there is no room left for that special soul which one thinks he must protect against the attacks of the materialist, and for that reciprocal action of soul and body, as two distinct entities, of which there is question in the last chapter of his *Physiological Psychology*.

The whole of this exposition would seem more or less antiquated if it were not that Wundt had published, last year,¹ a new and largely-amended edition of his *Lectures*, in which he makes, in comparison with his earlier views, a more or less definite retrogression. He even goes so far as to speak, in the Preface, of his earlier work as a "sin of his youth." We shall not attempt to determine whether riper knowledge or regard for the author's new position as professor of philosophy had the greater influence in the change. It is enough to point out that the difference of the main principles in the two editions is not so great as one would expect from the expression we have quoted from the Preface. For when we find on page 2 that "modern physiological research discards all dependence on earlier metaphysical theories," we see that the old idea of the soul, which rests on a purely metaphysical foundation, is at once excluded.

¹ 1892, namely.—TRANS.

When it is stated further that "every presentation is an image of an external object," and that "every element in presentative life must have had its origin in sense-action," or that "the presentations are formed of the combination of many sense-elements," that "all higher mental activity depends on presentative action," and that "sensitvity gives it its first impulse and continues to determine its course," we have the sensitive origin and determination of the soul laid down in a fashion which seems totally irreconcilable with any spiritualist hypothesis. When, moreover, Wundt rejects innate ideas; when he describes the psychic life of the brute as "in every respect an earlier stage of the life of the human soul," or as "a self-development of the mind"; when he finds instinct in man no less than in the brute, and thinks human life "filled with instinctive action on every side"; when he concedes the inheritance of mental characteristics, etc., we cannot see any discrepancy between these statements and many of the chief theses of his first edition. Even the contradiction or the open vacillation between spiritualistic and materialistic views on the specific question of the soul remains unaltered; save that, in order to sail safely between the two rocks, the author has excogitated a theory which he calls "the psycho-physical parallelism of the physical and the psychic." "There are," he thinks, "two concomitant series of causes, which never act directly on each other, and never inosculate." How this theory—which is not exactly new, as we find it in other writers—may be brought into harmony with the theses we have quoted above with regard to the relation of psychic and physical processes we must leave to the skill of Professor

Wundt; the involved and largely obscure phrases with which he essays to mask this irremediable contradiction, and in which he is no more successful than his philosophic colleagues, will only impose on people who are more eager for phrases than proofs. If "our whole psychic life has a sensitive foundation," and if there is "no psychic action which does not correspond to physical processes," to such an extent that "no idea, however abstract or remote from the world of sense, can be conceived by us without forming a sense-presentation of it"; if "there are physical stimuli corresponding to every mental process, which act according to the variations of sensation," etc., then it is absolutely unintelligible how body and soul can present two parallel series of causes, which have no direct interaction and never inosculate.

The whole psycho-physical connection of body and soul is without foundation, and it is impossible to see any utility in the many subtle and, on the part of Professor Wundt, very zealous researches into the manner of this connection—for instance, into the duration of psychic processes, the intensity of sensations, and so forth.

The demarcation of the two series of causes which Wundt adopts involves "mutual territorial respect," so that each province is regarded as complete in itself and independent of the other. This obviously excludes all question of relation of the corporeal to the spiritual; physiology and psychology stand out as two independent provinces, which, of their own nature, have nothing to do with each other, and must be treated separately.

If that is so, all psycho-physical research or study

of physiological psychology is superfluous. The old psychology, based on introspection alone, must be restored to honour, and all that has been achieved in this department of science must be abandoned. It is, therefore, quite immaterial whether we confusedly define the soul, with Wundt, as "the inner existence of the same unity which we regard externally as the body belonging to it"; or whether we subscribe to the "mutual interpenetration of body and soul" of J. G. Fichte; or the "psychic fluid" of Ulrici; or the "psychic atom" or "psychic monad" of Lotze; or the "psychic substance" of Rudolf Wagner; or the "carbon-fire of the brain, in which the soul flashes forth from time to time," of Fick; or the theory of the able cerebral anatomist Huschke, who holds thought to be "an æsthetic accompaniment of neural movement," and the mind and brain to be "a simultaneous symbolic expression." All these and similar theories, that would bury the important question of soul or brain in a kind of mist, merely betray the mental confusion and indecision of their authors, if not deliberate attempts to prevent the recognition of the simple truth out of hostility to a falsely-conceived materialism. This truth is that the word "soul" does not designate an independent entity, but is an expression which was used in a period of scientific ignorance and superstitious animistic ideas to designate the manifold functions or manifestations of the brain in relation to the entire nervous system. In other words, the term "soul" means nothing else than a collective idea, a general expression for the united functions of the brain and the nervous system; just as the term "respiration" is a collective idea for the activity of the respiratory organs, the term "digestion"

for the action of the digestive organs, and the term "circulation" for the function of the muscular system. Hence it does not designate an independent entity, but merely a function, however complicated, of the living body. The philosophical schools have committed the serious blunder of taking these and similar terms, which have in reality only a conventional signification, for real entities; and so have thrown a situation, so simple in itself, into irremediable confusion. Further, they commit the unpardonable blunder of separating in principle the motor and sensitive phenomena, or sensation and will, from the rational and ethical aspect of our nature, assigning bodily organs to the former and attributing the latter to the soul or mind; whereas throughout the whole of the science of life, or biology (anatomy, physiology, embryology, comparative anatomy and physiology, etc.), we have one long protest against such an unnatural separation. The fact of mental diseases, which just as frequently result from motor and sensory defects as, springing from moral causes, they draw the brain and nerves into sympathy, proves of itself how impossible such a separation is. How can anyone explain, on the Wundt theory, the well-known fact of a remarkable inheritance of mental diseases through one or more generations, by means of the microscopic germinal elements? There are innumerable instances of a strong influence of the physical on the moral on one side, and of the moral on the physical on the other. Is such a relation possible or conceivable between two series of causes "which never act directly on each other, and never inosculate"?

If it is the function of the nerves to effect sensation

—only connected as it is with the organic matter in the lowest animal forms, or to receive external impressions and convey the brain's commands to the muscles, it is also their function to collect those oft-repeated sensations or impressions and elaborate them into perceptions, presentations, ideas, and volitions, through the action of their ganglionic nervous cells. If this mental operation reacts, partly on its own organ the brain, partly by means of the nervous system on the entire frame, it is only following the analogy of all other bodily organs; in every case function is conditioned by structure, and structure by function (more or less). It is an instance of that great general law of nature, discovered a few centuries ago, that now pervades the whole of science like a breath of life, and to which there is no known exception.

It is the great law of the conservation or immortality of force which, as in the case of all other natural phenomena, must and does apply to the relation of the human soul to its material substratum. Sensation or thought, as a movement of matter, must necessarily provoke itself a new movement of matter, as can be proved to evidence by countless instances from science and from life.

On the basis of this anatomic-physiological theory it is easy to make a precise distinction between the ideas of "mind" and "soul"—two ideas which are so frequently interchanged, and in this way have caused, and still cause, endless conflict and confusion in philosophy and psychology. Even Wundt, on account of his belief in a special psychic substance, reveals his inability to solve this problem when he says that "the true nature of the soul consists of

nothing else but our mental life itself." No, sir, the idea "soul" is not identical with the idea "mind," but is far more comprehensive. It is much more than the mere totality of intellectual faculties; it embraces not only mental power, but also sensation and volition, or the whole of our psychic life from its lowest to its highest stages, whilst the mind (*animus*) is only a partial phenomenon of the soul (*anima*). The seat of the mind is in the grey bed of the brain; it is an expression for the action of the ganglionic cells contained therein, and so represents the highest psychic activity of which the brain is capable; the term "soul" indicates the activity of the whole of the brain in all its sections, including the sensory and motor actions which take place in the central grey bed, and covers the whole of the nervous system. Thus the word "soul" has, as I said, the more general and extensive connotation; the word "mind" stands for a narrow and more specialised idea; and therefore we grant the animal a "soul" in the fullest sense, but a "mind" only in a lesser degree. The highest degree of psychic activity, or mind, is found only in man, with his massive development of the cerebral lobes and of the grey cortical substance that covers them.

On the other hand, the farther we recede from man, descending the organic scale, the more isolated and unimportant do we find—in harmony with the decreasing perfection of the psychic organ—those psychic phenomena which we call "mental"; whilst on the other hand, granting a "soul" to the animals, there is nothing to prevent us from tracing the psychic principle throughout the organic world down to the very lowest animals, in which it is no longer

associated with a brain or nervous system, but directly connected with the living substance, and even to the plants, in which it presents its lowest stage of insensitive and unconscious irritability. This irritability and insensitive and unconscious psychic life are also found in the higher stages of the organic scale, when the organs of consciousness and of normal mental activity are removed, or disturbed in their function, as in the case of animals with the head cut off or the cerebrum removed, or men in natural or hypnotic sleep; and between these lowest manifestations of psychic action and the highest achievements of the human mind, or of a knowledge of things that has been obtained by the cognitive faculty, we find countless intermediate stages. Man does not differ from the brute in the possession of consciousness, since the brute also is conscious; but it cannot reach the highest phase of its action until the organic movement in the matter of the brain has acquired a certain strength, just as the bar of iron only begins to glow when it has been heated to a certain degree. Hence we may, if we wish, consider the entire nervous system, as well as the whole of the brain, to be the anatomic basis of psychic functions, especially in the lower reaches of the animal world, where the division of the nervous system into central and peripheral more or less disappears from view or ceases. But the *animus* (mind), as distinguished from the *anima* (soul), is always the product of the action of the various central nerve-structures; and it increases in strength in proportion to the advance of the principle of the division of labour and the differentiation of parts in the nervous system.

THE UNITY OF MATTER.

THE deeper science enables us to penetrate into the character of the laws and forces of nature, the more clearly we perceive their majestic and admirable simplicity. Thus the seven or eight forces with which physical science conducts its operations have become one single fundamental force, which does indeed reveal itself to us under very varied forms, but in reality remains one and the same. Not only can each force be directly or indirectly converted into any other of the group, but it has even been proved that, when a certain force is produced in a body, nearly all the other kinds of force become active at the same time. For instance, when we electrify sulphuretted antimony, it takes on magnetic properties at the same time, and becomes heated in proportion to the intensity of the electric force. If the latter force be increased, light is added to the heat, the body becoming luminous at a certain point. Moreover, it develops movement in space, and, finally, chemical action by its dissolution. Thus we have six different forces active at once in the same body and as a result of the same operation. Probably all kinds of matter or bodies are alike in this, so that, when any one force is induced in them, several others are simultaneously developed. And this would be the case with all if, as Grove (*The*

Correlation of Natural Forces) remarks, the matter were in favourable conditions for their development, or if our means of detecting their presence were sensitive enough. Each form of force is able to produce all the others, and none of them can be produced except by an antecedent force.

Hence, as Helmholtz admirably points out, we have one and the same force energising from eternity to eternity in the kaleidoscopic play of phenomena : now revealing itself as the living force of moving masses, now as the orderly vibration of light and sound, now as heat or the irregular motion of the tiny, invisible particles of bodies, now in the form of gravity in two bodies that tend towards each other, now as the internal strain and pressure of elastic bodies, now as chemical affinity or electric attraction or magnetic distribution. It disappears in one form only to reappear in another ; and, whenever it appears in a new form, we know with certainty that one of its other forms has been used up.

These and similar observations have inclined physicists more and more to the assumption—and, indeed, it is more than an assumption to-day—that all forms of natural force known to us are merely different modifications, or forms, or phenomenal aspects, of one and the same primitive and fundamental force, or that what we have hitherto regarded as isolated and specific forces are really only different conditions of one single force. However, the word “force” is no longer competent to explain the whole of the phenomena ; it would be better, perhaps, to abandon it entirely, and substitute for it the word “movement”—that is to say, the motion of atoms or the ultimate particles of bodies. This may at least

be said with confidence of all living, actual, or kinetic forces; though the name may be reserved as far as potential, latent, static, or elastic forces (gravity, cohesion, chemical difference) are concerned, until they have been definitely traced to a movement of the ultimate particles of matter or ether. But we may confidently predict that this will be achieved at no great distance of time. Even now no other explanation can be given for the impossibility of an action at a distance through empty space.

If, then, it is proved that all manifestations of force may be traced to a simple movement of the ultimate particles of matter, we seem to be logically impelled to postulate the unity of matter as an antitype to the unity of natural forces. The question arises at once whether the various chemical elements may not be, in like manner to the different forces, only different forms or phenomenal aspects of one and the same matter. As a matter of fact most of the thinkers who have taken up the problem have adopted this theory; they hold it to be highly probable that the chemical elements, which we cannot subject to further analysis, are not "simple" bodies, but are made up of elements of a higher order, and that these elements are probably ultimately derived from one primitive matter. "Thus," says Father Secchi, "it seems impossible to resist the conclusion that the bodies which we have hitherto regarded as simple are really elaborate aggregations of other elements, probably also compound, but that they are all reducible in the last analysis to one form of matter."

These theoretical considerations have been confirmed by empirical research, in virtue of the recently-discovered method of investigation which is known as

spectrum-analysis. The fact that the gaseous spectra of even the purest chemical elements reveal lines belonging to other and alien elements besides their own characteristic marks, and that some elements give different spectra at different temperatures, is of itself a strong presumption of the dissolvability of those elements. Now, however, the spectral-analytic researches of the astro-physicist have disclosed the fact that the grouping of the elements present in the stars can be observed in proportion to the increase of their temperature. The hotter and brighter a star, the more certain it is to show in the spectroscope very broad hydrogen lines and very few thin metallic lines, and the latter increase in proportion to the lowering of the star's temperature, or when it passes from a white to a yellow or red colour. These facts show that in the hottest stars even our elementary substances cannot withstand the dissolving force of the heat, or that the compound materials break up more and more with the increase of temperature; whilst, on the other hand, the lightest and most volatile metals, such as natrium, calcium, etc., only make their appearance as the temperature decreases, and they are gradually followed by the less volatile metals—iron, copper, silver, and so on. We know also, from experience in our chemical laboratories, that an excessively high temperature is able to neutralise the chemical affinity which binds the elements in combinations, to such an extent that we can by its aid dissolve any compound substance into its constituent parts. Probably, just as there is a certain temperature for each kind of matter at which it cannot be condensed, so there is also a temperature for each chemical combination, no matter what kind it is, at

which it cannot be maintained. If we had the means of creating the necessary temperature, we should be able to reduce the aqueous vapour and all the compound bodies we find, by means of spectrum-analysis, in the atmosphere of the red stars to the elementary condition of matter in the yellow, and finally in the white, stars.

Since, therefore, as we have already stated, *hydrogen*—the lightest and thinnest of all the chemical elements—has almost sole dominion in the white or hottest stars, as it has in those nascent cosmic systems which we perceive in the form of irresolvable nebulæ, it was natural to suppose that we may have in this the final product of the dissociation of material substances, or the first and earliest form of matter. This assumption was confirmed by a calculation of the English chemist, Prout, according to which the specific gravities of the various elements are multiples of the specific gravity of hydrogen; so that, according to Prout, the molecules of the various chemical elements may have been formed by the condensation of one simple element, hydrogen. Equal quantities of this matter would, therefore, form elements of the same weight, though they might be endowed with different properties, owing to a variation in the grouping of the ultimate particles.

It is true that objections have been raised to the universality of Prout's law; but we need not linger with it, as a glance at the origin of our solar system suffices to make us refuse hydrogen the character of primitive matter. For if we conceive the whole of the ponderable matter of our planetary system, including the sun, melted into a sphere with a diameter equal to the orbit of the outermost of our planets,

Neptune—and the nebulous sphere out of which the system has developed must have had such an extent, and most probably a far greater one—we have such an attenuation of the matter that the density of the nebula is only the 553,000,000th part of the density of our atmosphere, or the 10,000,000th part of the density of hydrogen; to put it in the language of Helmholtz, a single grain of solid terrestrial matter would, under such conditions, have to fill a space of many million cubic miles. If we admit the contention of some astronomers that the nebulous sphere of our system had a diameter of 2,000,000,000,000 miles, the density of its material would be only the 600,000,000,000,000,000th part of the density of the hydrogen, while at the time the ring of our planet broke off from the solar mass it had reached a density only 900 times less than that of hydrogen.

In the face of these considerations, it seems impossible to regard hydrogen otherwise than as the outcome of an advanced stage in the gradual condensation of the primitive matter, in contrast with which it would seem to exhibit the limit of development. In order to reduce it to the density of this matter, it would be necessary, if the above calculation is correct, to make it 600,000,000,000,000,000 times thinner than it is.

Naturally, we have no prospect of ever reproducing the primitive matter in our laboratories. We can only say that the remarkable researches that have been made into the inexhaustible and unimaginable fineness of the atomic constitution of matter are in complete harmony with the idea of such a primitive attenuation. On the other hand, there have been some remarkable experiments in the opposite direction.

Physicists have succeeded in liquefying, and even solidifying, by the application of a very low temperature and a high degree of pressure, bodies which were hitherto known to us only in a gaseous form, and of which this was believed to be the natural and unchangeable condition—such as atmospheric air, carbonic acid, hydrogen, and oxygen. According to the latest reports, they have discovered recently that solidified oxygen exhibits a property which has hitherto only been found in metals, or which was derived from the magnet. This, in fact, harmonises with an earlier observation of Graham's as to the metallic nature of oxygen; by thickening it with palladium medals were stamped. If, then, a difference which seems to be so considerable as that between metals and gases is proved to be due merely to a difference in the atomic grouping of the basic matter, we are forced to conclude, taking into account the preceding observations, that in the ultimate analysis there is only one form of matter, and that we must attribute the variety which it presents merely to variations in the condition or grouping of this primitive material, or element of the elements. “As soon as two atoms of the primitive matter combined, they formed a molecule of a substance which was no longer primitive—a substance with entirely new chemical and physical properties. Here we have already the possibility of an immense diversity. As the molecules of the new material entered into combination with each other or with the primitive atoms in various proportions, a new substance was formed every time; it needed a very small number of these primitive combinations to create our sixty-four elements.”

Thus does Moldenhauer describe the various stages in the gradual condensation of the primitive matter, the simplicity of which is a type of the simplicity of nature herself. *Unity of matter and unity of force*—those are the great goals which we read on the outstretched arms of the sign-post of modern science.

JACOB MOLESCHOTT.

“There will be no improvement in our condition until we begin to draw from the fountain of reality; then shall we find ourselves equally remote from the mysteries of the Church and from the dreams of those who call themselves idealists, yet are too little familiar with the origin of the idea to see it in the open miracle of nature’s life in matter and form.”

WITH these words did Jacob Moleschott, the distinguished scientist and thinker, who died at Rome on the 20th of May, 1893, in his seventy-first year, conclude the preface to the first edition of his famous work on *The Circulation of Life*. In that work he had ventured to emerge from the narrow confines of his professional physiological studies into the great market of publicity, and to work out the philosophic consequences of the materialistic views which his knowledge of science had inspired—an event which at once attracted wide attention to him. It is true that he had already, a year or two previously, published a popular exposition (*The Food of the People*) of his more scientific *Physiology of Food*, but he had little occasion in that to develop his philosophic attitude. His opportunity came a little later when Karl Vogt’s *Physiological Letters* (followed shortly by his noteworthy polemical work against Rudolph Wagner, *Superstition and Science*) drew general attention to the scientific treatment of the question of the soul. The time had not yet arrived for a calm acceptance of

so bold an assertion as the familiar "No phosphorus, no thought," which was first enunciated in the *Physiology of Food*, and repeated with additional evidence in *The Circulation of Life*. Vogt had already caused some excitement in the literary world, and it increased considerably when the great chemist Liebig took up the gauntlet Moleschott flung to him, and, in a discourse given in the auditorium of the chemical laboratory at Munich on "Organic Nature and Organic Life," sided with the partisans of the "vital force" which Moleschott had rejected, and which was being daily abandoned by physiologists, and treated his opponents as "dilettanti and tourists in the province of science," or as "children in the knowledge of the laws of nature." In his discourse Liebig, renewing the "phosphorus-battle" they had already frequently waged, turned especially on Moleschott, who had vigorously attacked from the physiological side Liebig's views on the chemical aspects of the metabolism in the animal body, and particularly his distribution of foods into such as only contribute to the formation or the maintenance of the tissues. Starting from the false notion that Moleschott and those who agreed with him attributed the possibility of thought to a "phosphorescence of the brain," Liebig tried to score over his opponents by contending that, on their principles, the bones which contain 400 times as much phosphor as the brain should also produce 400 times as much thinking matter.¹

¹ There is an interesting and accredited story told in connection with this discourse of Liebig's. Soon after its delivery the famous Bishop Ketteler, the head of the Ultramontanists of South Germany, had an audience with the then Grand Duke of Hesse, Ludwig III., who was noted for his wit. Ketteler complained of the growth of materialism, and wanted legislation to restrict it. But, said the

Moleschott did not find it difficult to reply to this poor argument in the chapter on "Thought" of the second edition of his *Circulation of Life*. Starting from the established fact that phosphorus has, as a chemical constituent of the brain, as definite and necessary a signification in its chemical constitution as any chemical element has in any combination whatever, Moleschott repeats his axiom, "No phosphorus, no thought"; though he does not mean that the thinking-power of a brain may be measured by its richness in phosphorus, or that clever men must have more phosphorus in their brains than stupid ones. The composition of an instrument may err on the side of excess as well as of defect. He further declared that he might have taken any other constituent of the brain—albumen, cholesterine, potassium, even water—just as correctly as phosphorus. In this Moleschott has probably gone a little too far, because the more recent researches of Borsarelli, Byasson, L'Héritier, Foster, Maudsley, Liebreich, and others, have shown that the phosphoric elements of the brain have really an exceptional importance for its thinking capacity, as I have pointed out in *Force and Matter* (17th edition).

The publication of this work coinciding with the second edition of *The Circulation of Life*, I took the opportunity, in the Preface to the fourth edition, of criticising Liebig's discourse and of defending Moleschott from his attacks. For this I received a

Grand Duke, matters were not so bad seeing that Liebnitz had recently made such a vigorous attack on materialism. "Don't make too much of that, your highness," replied Ketteler; "Liebig is a materialist himself at the bottom of his heart." "And why shouldn't he be?" said the Grand Duke. "His father was one before him." (Liebig's father was a druggist [*material-warenhändler*] of Darmstadt.)

letter from Moleschott at Heidelberg on March 18th, 1856, which ran as follows :—

“Your friendly service, unfortunately, reaches me in the middle of the trouble of departing for Zürich. Nevertheless, I was constrained to read your Preface at once, and I have nothing to reply to it. I think you are right in not allowing Liebig’s arrogant behaviour to blind you to his real greatness—but *ne sutor ultra crepidam* applies to him also. I would only draw your attention, in a friendly way, to one point: Carefully avoid the appearance of attacking the distinction of a man who is respected. No one can give a guarantee of the soundness of views, neither Liebig nor anybody else. It is otherwise with the mass, but the better sections of the public are easily disconcerted when you ask them to balance one man against another. As this is merely a question of appearances, I have no fear you will misunderstand me,” etc.

I only find one other letter from Moleschott among my papers. It is dated from Heidelberg, June 26th, 1855, and in it Moleschott thanks me very warmly for sending him one of the earlier editions of *Force and Matter*. He continues :—

“Your agreement with our philosophic writers of true critical judgment has given me great pleasure, because, curiously enough, scientists who devote themselves to philosophic studies—I mean, of course, critical philosophy, not speculative natural philosophy—are rarely distinguished for clearness and consecutiveness.... The second edition of my *Circulation*, of which I send you a copy, may congratulate itself on taking the field with such an auxiliary as yourself.”

I have never known Moleschott personally, nor had a correspondence with him during his stay at Zürich and in Italy. It has, therefore, often surprised me to find myself bracketed as a sort of Trinity with him and Karl Vogt (whom I knew personally as a student at Giessen, though I have never corresponded, or had literary relations, with him), that aimed at plunging the world into the abyss of materialistic infidelity. There has never been any other than a community of thought between the three of us, which

has resulted from the splendid achievements of modern science and their application to the religious and philosophic views of the past and the present. At the same time, I will not deny that I owe to Moleschott the first impulse to compose my later and more important work, and particularly to the chapter of his *Circulation* which has the same title.

In this chapter Moleschott attacks a short-sighted teleology and the agreement with it which one finds in Liebig. Further, he rebuts the notion that there may be matter without properties, or properties without matter. All forces are, he thinks, only states or movements of matter; wherever we perceive a movement of matter some property of it is found to be the cause of the movement. "That property of matter which makes its movement possible is what we call force." "The property which oxygen has of combining with hydrogen for the formation of water is always present. If it were possible to deprive oxygen of this property, it would no longer be oxygen." "The property never comes from without." "Force is not an impelling deity, not an entity distinct from the material groundwork of things; it is the inseparable, eternally inherent property of matter." "A force which was detached from matter, which hovered freely over it, and could espouse it when it willed, is an impossible idea. Nitrogen, carbon, hydrogen, oxygen, sulphur, and phosphorus possess their properties from eternity."

These passages express the fundamental idea of the whole subsequent research, which is confirmed by the quotation of a multitude of details from chemistry and physics. These details are increased to such an extent in the most recent edition of the *Circulation*

(1887) that the chapter has reached three times the size it had in the second edition. This is partly due to an exhaustive criticism of the theory of a vital force, based on the classical researches in synthetic chemistry which Berthelot had published in the meantime,¹ but chiefly to an excursus on the revival, on the strength of the advance of geology, palæontology, and evolution, of the theory of descent by Lyell, Darwin, Huxley, Haeckel, etc. Moleschott naturally professes complete acceptance of the theory; and he attributes the first appearance of life to abiogenesis, and accepts the animal parentage of man. "Haeckel's primitive amniote is," he says, "no more legendary than the belief that Achilles had a father, or that the chicken in the egg represents the term of a thousand stages of development." "It is a mere illusion," he says again, towards the end of the chapter, "for writers to take matter for a chimera by giving the word a meaning which is not natural to it. Lichtenberg said long ago of this notion of the psychologists: 'There is nothing of the kind in nature. It is the psychologist who kills matter, and then says it is dead.' The materialist believes in the unity of force and matter, mind and body, god and the world, while the dualist clings to the absurd idea that nature is an arbitrary play of combinations," etc.

The other chapters of the *Circulation* were similarly enlarged, and the book grew to such proportions that, in the most recent edition, it appears in two stout volumes. The author has also added two new chapters to the twenty shorter ones of the original work. In

¹ He says, on page 42 of the second volume: "Berthelot has solved the riddle with which the Sphinx of the vital force has hitherto prevented us from realising with success the artificial production of organic conditions without the use of organic matter."

the first he deals exhaustively with the discovery made by Robert Meyer in the interval of the conservation or immortality of force, and applies the principle to the question of brain and mind. Severe mental exertion involves the same metabolic changes, or the same consumption of energy, as severe muscular exertion; it makes us warmer, more hungry, tired, and so forth. The ultimate source of all energy on earth is the sun.

The second additional chapter seeks to summarise the results of the whole inquiry. We may resume this summary as briefly as possible.

There is no such thing as revelation. The only revelation is that of nature. The path of revelation leads to prayer, not to inquiry. Science excludes revelation. The law of nature is the strictest expression of necessity. All knowledge comes through the senses. Man is the measure of all things for men. "There is nothing in the mind that has not passed through the door of the senses." "The development of the senses is the basis of the development of the human understanding." "Experience must merge into philosophy; philosophy into experience." The law can only be discovered by experience. The essence of things is the sum-total of their properties. Combination, form, and force are the inseparable characteristics of matter. Change of matter and form in individual parts with a permanence of the broad outline is the mystery of animal life. Without metabolism there is no life. The taking of oxygen into the blood is the fundamental condition of the formation and destruction of the tissues of respiration. Thus the extremes of growth and decay meet continually. "Such is the circulation of the matter which

death has pressed into the service of life." The essence of animal metabolism consists in a slow combustion, and the heat that is produced in the process is the only force that is developed in the body. "And since heat is of material origin, all forces are born of material movement; matter rules man." We were not created, but slowly evolved, like everything else in nature. The expression, "the story of creation," must be banished from science. The first organisms arose by abiogenesis. The ancestral history of man commences with the primitive cell, and gradually ascends to the highest stage of the vertebral type in the course of endless ages. The "crown of creation" must modestly regard himself as "a bud on the tree of animality." "Science has succeeded in artificially producing from the elements the original constituents of organic matter." "The assumption of a special vital force is proved to be quite useless. Life is merely the outcome of the elaborate co-operation and reciprocal action of chemical and physical forces." Man owes his highest development to the formation of his organ of thought, or brain, which has more need of oxygen than any other organ. The human brain is superior to the brains of all other animals in its wealth of nerve-cells, in phosphoric albuminoids, and in the construction of its various parts. We know no more of the manner in which the brain produces thought by the movement of its ultimate particles than we do of the grouping or the movement of the particles in a magnetised or electrically charged copper wire or in a horse-shoe magnet; or, rather, we *do* know more, since we know the chemical and physical conditions or changes under which the brain works. The brain is just as essential for the production of

thought as the liver for the secretion of bile, or the kidneys for the excretion of urine. Still thought is not a fluid, any more than heat or sound, but a movement of the matter of the brain, a necessary, inseparable property of it. "It is just as impossible for a normal brain not to think as it is for thought to have any other material base but the brain." "Consciousness resides in the brain alone; it disappears when the supply of blood to the brain ceases."

The personality of man is gradually formed under the innumerable stimuli or impressions of the outer world. "Man is the outcome of parents and nurses, place and time, air and weather, sound and light, food and clothing: he is an ever-changing product of nature. We are at the mercy of every pressure of the atmosphere." "There is no such thing as free will, an act of will that shall be independent of the totality of influences which affect a man at every instant, and limit the deeds of the strongest."

"Creative omnipotence is the attribute of matter. The idea of a personal god vanishes in proportion to the purity and consistency of the development of the mind:—

Nemo contra deum nisi deus ipse."

The *Circulation of Life* owes its original inspiration to a campaign directed especially against Liebig and his *Chemical Letters*, and was consequently entitled *A Physiological Reply to Liebig's Chemical Letters*—a title which has disappeared in the latest edition. The *Chemical Letters* had attracted much notice at that time, and therefore anything written in opposition to them was sure of success. Liebig's rather confused and contradictory remarks on faith and knowledge had perplexed his readers, and people

turned at once to Moleschott for a solution, seeing the recent break-up of the speculative or school-philosophy. Moleschott's attacks on Liebig were, it is true, rather too technical for the intelligence of the general public. But Moleschott, with his philosophic mind and proneness to general truths, was not satisfied; he appealed on every opportunity to the mass of educated people. As little had hitherto been known by the general public of these matters, they were much struck and interested with Moleschott's ideas, and scarcely a single book at that time that had reference to controversial questions of general import failed to quote Moleschott one way or another. The success of the work would have been far greater if the mass of chemical and physiological details, more or less unintelligible to the layman, had not deterred the reader, and if its contents had not been too learned for the people and too little learned for the expert. When a man writes for the general public, or even the general run of educated people, he must leave at home his "uric acid ammonia," "organic gallic acid," "butyric or chenopodial base," "oxyhydrate of phenyl," and such like. He must present in large and sharp outline the general results of scientific research which have an important bearing on life; and he must be briefer than the author of the *Circulation*. He is also difficult to read on account of his epigrammatic style and his fashion of passing quickly from one fact to another, and from one class of ideas to a quite remote series.

From a strictly scientific point of view the chief value of the work lies in the ninth chapter, where he endeavours to impair Liebig's well-known distribution

of foods into nutritive and respiratory or plastic, and heat-producing or nitrogenous and non-nitrogenous. Moleschott's attacks have greatly contributed, in spite of Liebig's high authority, to the present virtual abandonment, or, at all events, very limited acceptance, of this classification, which once had a great vogue. At the same time, Liebig's classification, if we do not take it too strictly, and if we strip it of Liebig's teleological additions, holds good to the extent that in a mixed diet the plastic or albuminous foods go chiefly to the building of the organs, and the non-nitrogenous chiefly to the production of living force, heat, electricity, mechanical and mental work.

From the remaining contents of this interesting book the chapter on "Life," which was the final one in the earlier edition, is of general interest. Metabolism is first treated in almost poetic diction; it is, in a sense, the keystone of his construction. Throughout the whole of his work the author has shown that what we call decay, destruction, or death, cannot be taken in this sense in nature; there is neither beginning nor end in the unceasing circulation of matter, and the finest germs of life are to be found in ruin and decay. From this point of view Moleschott makes a vigorous attack on the practice of interring the dead, which withdraws so much valuable material from circulation; he may thus, in a sense, be regarded as a pioneer in the agitation for cremation. "If we could burn our dead," he says, "we should enrich the air with carbonic acid and ammonia, and the ashes, which contain the means of building up new cereals, animals, and men, would convert our moors into fertile meadows. Yet we waste daily in our

graveyards alkalies, earths, phosphoric acid—the phosphoric acid salts which are undeniably the most important tissue-builders in the germs of wheat and oats and the bodies of animals and men.”

There is also a reference to the great social question in this chapter. With a hint at a reform of the legacy laws, the hope is expressed that some day science may obtain such control of matter “that poverty, in the sense of unsatisfied want, may become an impossibility.” “Scientists are the most effective workers in the social question. It may reveal itself as necessity, but it will never be solved by violence. Its solution lies in the hand of science.”

How correctly Moleschott spoke in this will be realised by a glance at the attempts, increasing in favour every day, to approach the social question from a scientific point of view, by a greater equalisation of the means with which the individual fights the battle of existence.

None of Moleschott's later writings can be compared in influence on the general public with his *Circulation of Life*. This applies equally to his biography of Georg Forster, whom he called “a scientist of the people”—not without noticing a contradiction in the title—his *Physiological Sketch-book*, his collection of “smaller writings,” or his work on *The Dawn of Hermann Hettner*. The most notable of them is the *Sketch-book* which gives, in a chapter on the sources of man's energy, an admirable dissertation on food and luxuries, and returns to the “phosphorus-controversy” and the attack on Liebig's classification of foods. A second chapter on “Fresh Air” describes the wholesome influence of walking and exercise in the open air on the physiological economy. A third

chapter deals with Georg Forster, and seeks to vindicate the title of "Scientist of the People," appealing to Forster's saying that "men must be convinced some day that the sources of the noblest and most lofty actions we are capable of have nothing to do with the ideas we form of God, of the life to come, and of the spirit-world." The fourth and last chapter deals with "The Human Cornea"; it describes the anatomic-physiological characters of the skin in a way which makes one greatly regret that Moleschott never put into execution the scheme he hints at in the preface of this work of writing a popular anthropology.

This neglect is partly explained by the fact that Moleschott had resumed his professional studies and his function of academic teacher owing to an invitation he received in 1856 to lecture on physiology at the University of Zürich; his tutorship at Heidelberg had come to an end in 1854, when the Baden Government had sent him a caution on account of his notorious materialistic views. Moleschott answered the warning, with a feeling of injured pride, by resigning his position as tutor at the University. From that date he only conducted a private chemico-physiological laboratory at Heidelberg until, as I said, the invitation to Zürich restored his proper function and his professional studies. He embodied the abundant results of his studies in his *Researches into the Natural Science of Man and the Brute*, which he began in 1855 and continued, in no less than fifteen volumes, until his death. In the inaugural discourse he gave at Zürich on June 21st, 1856 (afterwards published under the title of *Light and Life*), he again took the opportunity, in connection with his special

and very valuable studies of the effect of light on the respiratory process in animals, of dealing with his philosophic views and the attacks they had brought upon him. The emission of oxygen is, he said, the characteristic of plants; this is only accomplished in the light. The oxygen which has been set free in the vital process of the plant enters the atmosphere, and thus serves for the respiration and nourishment of animals. Plants only emit oxygen whilst the sun shines on them, fixing the carbonic acid contained in the atmosphere and setting free its oxygen. In the light, which is made up of many kinds of rays, it is, according to recent research, only certain special rays, the actinic rays, which govern the chemical nourishment of the plant. During the night or an eclipse of the sun the process is reversed—that is to say, the plant then absorbs oxygen and emits carbonic acid. Hence the plant is literally a child of the light, dependent on it in origin, nourishment, and growth. With the animal, on the other hand, respiration always has the same chemical features, though it is wholly dependent on the existence of the plant. Without the oxygen which the latter emits the animal could not live; and it in turn emits in breathing the carbonic acid which is so necessary for the life of the plant. Thus arises the well-known and interesting reciprocal action of plants and animals in respiration. Nevertheless it is an error to suppose that light has no effect on the respiration, and therefore on the life-process, of the animal. Although it is not so striking as in the case of the plant, yet it is important. Animal respiration is much slower in darkness than in light. The better the light, the greater the expiration of carbonic acid. And, since the whole

metabolism is intimately connected with respiration, the sun-light has an accelerating effect on it, and stimulates the whole organic life, especially the functions of the nerves and the mind. This stimulating influence of sun-light is absolutely necessary for normal organic activity. It is well known how health is injured by want of light, and what miserable creatures are born and brought up in the dark, dismal cellar-dwellings of large towns and in the crowded and narrow tenements of the proletariat. Who has not noticed the depressing effect of a dull, rainy day on our feelings, and consequently on our comfort, in contrast with the buoyancy and radiance of our whole being on a bright sunny day.

These interesting remarks naturally lead Moleschott to consider the limits which external nature puts on the free will of man—man whom he considered as a product of nature, not an arbitrary agent. This brings him once more to the attacks of his opponents, who, like Liebig, are more concerned to cast odium on their scientific critics than to answer them. Materialists, says Moleschott, do not deny the existence of the mind; they do not pretend to explain the mind or life. The inseparable connection of mind and matter is not an explanation, but a fact. Nor are we in a better position to explain the natural unity of force and matter; we can only say it is a unity of natural necessity, determined to eternal movement and eternally moving. It is only the illusions of childhood that set everything in a false light, and would make us see a duality in place of that unity. Philosophers are just as incompetent as scientists to explain the mind; but the scientists are at all events shrewd enough to avoid the attempt. They do not

deny its existence when they show that the ebb and flow of the movement of the brain corresponds to the ebb and flow of thought, and that a change in the matter implies a change in its functions. The assumption of a mind that would be independent of matter and above it is opposed to all our experience.

At Zürich Moleschott made the acquaintance of an Italian exile, De Sanctis, who greatly appreciated him; after his return to Italy and nomination as Minister of Instruction he at once invited Moleschott to accept the newly-founded chair of physiology at the University of Turin (1861). Moleschott, who was Dutch by birth, adapted himself to the Italian with the same ease with which he had mastered German; he was soon in a position to begin his lectures in Italian. Even his inaugural discourse on "The Investigation of Life," at Turin on December 16th, 1861, was delivered in Italian, and, as the *Revista Italiana* for December 23rd says, it made a profound impression in spite of a few faults of diction. "Professor Moleschott," says the *Revista*, "spoke of physiology and the organism not only as a physiologist, but as a philosopher, and showed by his own example how closely-allied positive science and philosophy are when the one is elevated and the other profound." He gave another discourse on the 24th of November, 1862, on "The Limitations of Man," on the occasion of the reopening of the physiological lectures at Turin. He explains in it the meaning of the famous saying of Protagoras that man is the measure of all things in the light of physiological-philosophic considerations, and makes special reference to the important calculations of the speed of the

nervous principle and of thought which had just been published.

In a third discourse at the reopening of lectures on November 23rd, 1863, he treats "The Unity of Life" from a philosophic point of view, and endeavours to apply to biology or the science of life the Hegelian threefold division of the history of the world; according to which humanity in its first stage, devoid of prejudice, perceives no antithesis of body and soul, in the second stage aspires to a transcendental felicity, and in the third recognises its unity with the macrocosm. In the first stage of biology (430 B.C. to 1600 A.D., or from Hippocrates to Galilei), which Moleschott describes as the vitalist, teleological, and poetical stage, we have the unprejudiced frankness that knows nothing of the dominion of mechanical, physical, and chemical laws over the phenomena of life, and sees no contradiction between the vitalist presentment and the reality. Before the time of Galilei no part of organic life was described in its material aspects with its true causes and effects. Galilei, the able observer, stands on the threshold of the second period; he has almost more right than Bacon to the title of the father of exact science. Then came the time of Harvey, the great discoverer of the circulation of the blood, but also of Stahl, Sydenham, Paracelsus, Borelli, Boerhave, Haller, Bichat, etc.—the Iatromathematicians, Iatromechanicists, Iatrochemists, etc. Physicians lost themselves in unfounded speculations about bad humours and fermentations, acid and alkaline sharpness; substituting chemical chimæra for the dreams of the vitalists, and giving the ascetic and analytic period of science the dualistic character, according to which physical laws and

vitalistic creations wage war in the organism. The third period, which Moleschott calls synthetic or unifying, seeks to gather up the plurality of organic functions in the unity of life. The famous *Archæus* of Von Helmont, which rules the whole life from the stomach and abdomen, was transformed into a thin solution of pepsine and hydrochloric acid, which effects the digestion of albumen by means of its chemical properties. The seminal ether took real shape in the active spermatozoa which make their way mechanically into the ovum. Instead of vital spirits came the relation of nerves and muscles, and the nerve-ether gradually assumed electrical, optical, thermic, and chemical properties. The imaginary metastases of disease gave way to mechanically advancing fibroid coagulation ; “the well-spirits took to flight before the light of spectrum analysis.”

Modern physiology feels that it is not a systematic science that can put a label on each organ, but that it finds itself face to face with an eternal break of waves which converts the phenomena of life into a vortex of change. “The organs are no longer separated by a plurality of aims, so that *archæus* can excite war amongst them. They are united in ceaseless co-operation, effecting the unity of life by countless and necessary reciprocal relations.”

But this unity of life is not due to the mystic “vital force” which formerly hung over the heads of physiologists, like the sword of Damocles, in their efforts to discover a necessary bond of union ; it arises from the profound interdependence of the functions on every side. “Life is not less a unity because it does not depend on an arbitrary free-will, but obeys the inevitable laws of the general fatality of nature.”

Another discourse was given to the Turin Scientific and Literary Society on March 21st, 1864, under the title of "A Physiological Embassy." Moleschott represents himself in it as an ambassador from the kingdom of the "Polybrosians," and very skilfully works out the analogy between the vascular system (Polybrosia), with its sixty thousand trillion or so of inhabitants (the blood-corpuscles, which are divided into red and white, or workers and non-workers), and a social commonwealth.

Moleschott soon won the hearts of his students at Turin. It was otherwise with his colleagues, who looked with little favour on the foreigner, and especially on his lucrative medical practice. Envy and jealousy rose against him; the obscurantists especially attacked him. There was a change when, in 1879, Rome having become the capital of Italy, and the Roman University being erected, Moleschott was invited to lecture on physiology at Rome. He had been honoured with the dignity of an Italian senator three years previously. Thus he found—apart from heavy domestic misfortune—honour and success in the evening of his life. Moleschott was master of the situation from the beginning at Rome; he was greatly appreciated by his colleagues, and had some warm friends among them. His practice as a physician was very extensive. At the same time he did not neglect the political duties of his position as senator, and he had many a sharp conflict for the freedom of science and religion. That he did not use his literary power more in the cause of popular science is intelligible enough. He did, however, publish at Rome in 1887 the fifth edition of *The Circulation of Life*, enlarging it, as I have already said, to nearly twice the original

size, and almost entirely removing the controversy with Liebig. "I resolved," he says, on this point, in the preface to the edition, "instead of pouring new wine into old bottles, to undo altogether the bottle of the old controversy, in the hope that the juice it contained would suffice, and now flow out more freely."

He seems to have remained faithful to the end to his materialistic opinions. The Dutch Freethinkers, who are very numerous, made their journal, *De Dageraad*, a kind of memorial number of their great countryman on his seventieth birthday (August 9th, 1892), with a portrait and an exhaustive appreciation of his merit. Ten months afterwards the hand of death was laid upon him; in his own phraseology, he arose again in the eternal play of atoms, or the eternal metabolism. True to his principles and his horror of earth-burial, he had directed that his remains should be cremated and the ashes cast on the breeze. The first part of his request was fulfilled. Legal difficulties prevented the execution of the second part; and it was, therefore, decided to suspend the ashes in a porous vase in the vault.

So ended the life of a man who has won an indisputable place in the history of science and of the evolution of the human mind. From the point of view of science he was the first, or one of the first, to reconstruct the science of food on a chemico-physiological—that is, a truly scientific basis; this in addition to his many detailed contributions to physiology and physiological chemistry. From the point of view of philosophy he was the first to begin the great struggle of the science of the last century against the half-philosophical, half-theological views

that had hitherto prevailed. He was particularly opposed to the old theory of a vital force and to teleology, against which even so distinguished a scientist as Liebig could not hold firm.

His theory of metabolism made the first decisive use of the principle of the immortality of matter, which Lavoisier had discovered at the close of the eighteenth century; and this was before the general acceptance (which soon followed) of the great principle of the conservation of energy had given it its necessary completion.

The general opinions which he enunciated have, in a shorter time than could have been anticipated, received a somewhat remarkable confirmation and extension through the revival of the theory of evolution, which was, from quite a new side, to throw a brilliant light on the science which Moleschott chiefly cultivated, biology. As I have already said, Moleschott paid due attention to this vindication of his almost prophetic views in the last edition of the *Circulation*. He has, at all events, the merit of first opening out the perspective of this whole inquiry; if the stimulus he gave has caused ever-increasing waves, and drawn ever-widening circles into sympathy, since his time, this rather enhances than depreciates his merit. It is true that the intellectual struggle it has involved is still far from ended. The powerful forces against which Moleschott contended cannot be overcome in a day. Nor can any man penetrate the future, and say how it will end, and whether humanity will ever succeed in casting off its ancient and venerable prejudices.

But, whatever be the issue, the name "Moleschott" will ever remain on the gates of that temple of light

in which the small group of truth-seekers of all times and all lands offers its devotions—not, indeed, to the accompaniment of the proud swell of the organ, but in the common feeling of philosophic regard.

APRIORISM AND EVOLUTION.

Now that the theory of evolution has made good its claim, not only in the province of biology, but also in nearly every branch of speculative science, it is time to ask ourselves what effect the theory is calculated to have on the philosophic views that have hitherto prevailed. It is clear to even the most superficial observer that this influence must be a profound one. All previous systems of philosophy were based almost exclusively on what is called apriorism. Now, it is obvious that the theory of evolution immediately excludes all apriorism in the sense of theoretical philosophy, since it admits no phenomenon in heaven or earth, whether in the macrocosm or the microcosm, that has not its roots in some antecedent evolutionary process. In this, it is true, there is no condemnation of philosophy as such, since it could arrive at no other conclusion without the magical guidance of the law of evolution, so often sought, but hitherto without proof. In face of the external world, and of life, philosophy was just in the same position as a visitor to a theatre would be, for instance, with regard to the spectacle unfolded before him, if he had no acquaintance with theatrical methods. If he had no knowledge of the slow preparation and the repeated rehearsals which preceded the spectacle, he would be constrained to think that the scene before him had

suddenly sprung into existence, or fallen from heaven. That is just the position, in face of the wondrous spectacle of the world and of life, of the observer who has not the aid of the glass of science to see into the wings, and to learn that this vast spectacle is not of to-day or yesterday, but is the last act in a mighty drama, for which the preparations have taken millions of years. There have, indeed, been a few penetrative minds—a Democritus, or an Epicurus and his successor, Lucretius Carus, or an Empedocles, or a Kapila—who have glimpsed, but *only* glimpsed, the true connection of things, by an intuition of genius, many centuries ago. Their opinions could not find general acceptance, because they were unable to give them a scientific groundwork, and because the dominating impression of the spectacle of the moment kept in bondage the minds of, not only the crowd, but even the educated and the learned. This fatal circumstance still ruled the world in the days of Locke, Hume, and kindred spirits, who vainly combatted philosophic apriorism.

All this has now been changed, owing to the marvellous progress of human knowledge. We now know that our planet, with all its wonders and glories, is not an artificial creation that sprang suddenly into being at the word of a great magician, but has been developed, as one member of a planetary system, out of a vast nebula that once filled the void of space, by the force of natural laws and agencies, and in the course of immeasurable ages. We know, further, that the organic world it bears is also not the outcome of a momentary creative act, but has been slowly brought to its present greatness and variety from the humblest beginnings, by the gradual operation of agencies which

are no longer mysterious, and again in the lapse of an inconceivable period of time. We know, finally, that the laws of this development hold good for our own race, as yet the highest point in the organic world, and that our human vanity must stoop to search our first ancestors in the ranks of the nearest animals. As, moreover, it has been proved that bodily and mental development proceed together, and that the germs of even the highest mental powers are found in lower regions, ascending gradually to higher and higher stages, there is no room left for any assumption of a preformation or a predetermination which should have effected the rise of those powers independently of experience. The *à priori* or unconditioned character which philosophers have attributed to certain fundamental ideas of the mind may be usefully compared with the earlier, and now entirely abandoned, theory of "preformation" which was held by what were called the "evolutionists" in the science of organisms, especially in embryology. In both cases it was assumed that something was ready made from the beginning, whereas in truth there was in each case a development, or entirely new growth, out of primitive elements, determined by past conditions; so that the theory of epigenesis, or gradual formation, has now completely ousted that of preformation, and the evolutionism that accompanied it. And, as mechanism and logic are one and the same, and reason in nature is identical with reason in thought, it is obvious that the same relation must hold of the origin of thought and forms of thought.

The human reason or intelligence is but a mirror that reflects the whole; it is the last outcome of the constant intercourse which the animal-human mind

has maintained with the outer world for ages innumerable. The million-fold repetition of the same impressions which are experienced by every living creature at every moment of its waking life, and which are determined by the absolutely constant general relations of subject and object, must necessarily induce, in the course of time, a kind of mental habit, or a disposition of the brain towards a certain form of action—a disposition or determination which is transmitted from race to race, and at length becomes so automatic that it has the appearance of being innate, and independent of all experience. To put it in another way, there must result at length a certain state of the brain and its functioning that seems to be the last result of a process of acquisition, experience, and heredity. Thus the individual cannot divest himself of these transmitted forms of thought, since they are inherent in the very organisation of his brain; yet these forms are not *à priori* in the sense of the theoretical philosopher. They are *à priori* only in the sense that they precede the experience of the individual, but not the whole of experience. In other words, the alleged apriorism of the forms of thought is true for the individual, but not for the race.

Kant and his successors were guilty of the fertile and fatal error of only considering the human mind in its completely-developed condition, and not in the course of its development; they regarded the laws of thought and thought itself as accomplished facts, without inquiring into the mode of their origin, and especially without taking into account the part that heredity plays in the origin of forms of thought. Whenever Kant encountered ideas which he could not

trace in actual experience, because they were either too complex or too greatly metamorphosed, he relegated them to his "fairy temple *à priori*," where the twelve categories of pure reason—including the idea of causality, which he regarded as a form utterly independent of presentation—sat enthroned in empty unreality. The idea "*à priori*" itself is not clearly defined, but taken to be understood, whereas it is really one of the most obscure of ideas. When Kant defines his "pure reason" as the faculty which gives us the principles of *à priori* knowledge, there is no question of test or criticism; it is out of court at once. His well-known thesis, that all knowledge begins with experience but does not arise from it, is obscure and contains an irresolvable contradiction. His famous "criticism of pure reason," which has been so much talked about, is a pure impossibility. Since there is no such thing as "pure reason"—that is to say, "a faculty that gives the principles of *à priori* knowledge" (to use his own definition)—there can be no criticism of it. Reason is rather a faculty that has been acquired slowly and gradually; its origin and character can only be understood in the light of the modern science of evolution, which was unknown to Kant. Since we have learned that man, like every living thing, is subject to the law of gradual development, and that all he is and has is a gift of nature itself, he can only be understood—both in his bodily and his mental aspect—in the light of the natural laws of life and death. All speculations about his nature which start from *à priori* considerations, or rest on the power of pure thought, are absolutely worthless.

"There can no more be ideas antecedent to all

experience," says A. Wiessner, "or forms of thought without any basis, than there can be effects without causes. The reason why we cannot recollect how we became possessed of the ideas of time, space, and causality is simply that the acquisition of them belongs to the period of the formation of our consciousness—the commencement of the acquisition is lost to memory."

For the rest the thought-forms of time and space, which Kant considered to be *à priori*, would seem to be grounded in the spatial extension of the organ of thought itself, and in the temporal character of cerebral processes. Hence on that very account it is impossible for our mind to divest itself of these limitations in its working, although the whole of nature as such is not subject to them. Even Nägeli seems to hold this opinion, when he says that "we are ourselves a part of nature, and the impressions which we receive from without and elaborate, proceed according to space, time, and causality, in our nervous system; hence thought also, when it proceeds correctly, must lead to a knowledge of causal connection and of time and space."

In particular the feeling of causality, which Kant held to be innate and independent of all experience, is only familiar to the thinker and scientist, not to the uneducated people at large. While the feeling of causal connection is very indefinite in the brute, it increases in man; and at length, after much experience and usage, gradually reaches consciousness. "The full and clear consciousness of the general law of causality," says Nägeli, "is found in only a very few men, so that even the majority of scientists themselves reject it at times, and many physicists think it

was only detected in recent times in the form of the law of the conservation of energy."

It is the same with the contents of thought as with its forms. There is no *à priori* knowledge; that is a thesis which not only reveals the fundamental error of the Kantist philosophy, but also the impossibility of metaphysics as a science. It is absolutely impossible to have judgments or ideas *à priori*; all are the outcome of experience. No experience, no thought. Even Kant himself says—however much it contradicts his earlier utterances—that knowledge derived from pure reason is "mere appearance," and that truth is to be sought in experience alone.

Since experience can only be obtained by means of the five senses (the so-called "internal" experience of philosophy is the same thing as apriorism, or knowledge derived from pure reason), the question of the value and significance of sensitive perception is of extreme importance. A man who was devoid of all the senses would have nothing human about him; he would have to lead the life of a plant (apart from the sensitive plants). The possession of one single sense would, as we see in the case of the blind, deaf, and dumb, greatly alter the situation. In point of fact it is not the senses themselves which affect knowledge; two other factors are necessary, on the co-operation of which with the sense-factor depends the whole process of perception, and therefore of conception. The first is the brain-factor, the second the external object. These three are most intimately connected. If one of them be eliminated, the whole mechanism ceases to act. Without external stimuli or impressions there is no sensation; without sensation there can be no world-image;

without this world-image there can be no thought or intellectual activity. Without the senses we should have no means of receiving the world-image; without the brain we should have nowhere to receive and elaborate it. If this relation is not immediately obvious in the case of every single object of knowledge or will, a little inquiry will establish the correctness of our theses in each case, and prove that even the most intricate of our mental operations, or the most elaborate associations of ideas, may be traced to an origin in sense perception. "Whether that which lies beyond the subject, and which is the real matter of our thought, is near to or remote from experience, it is always by means of transformed matter of experience that we reach that province" (Volkett). "However abstract an idea may be, its last roots are always found in sense-perception" (Piderit).

Naturally, the third of these factors, the brain-factor, will be the more competent to perform its part the better it is organised, and the more ample and important the material that is conveyed to it by the organs of sense. Hence, though the animals have, to an extent, finer senses than we, they remain inferior. Even if we had much keener senses, or more senses, than we now have, it would not make any considerable difference to our knowledge, unless the other two factors experienced a similar expansion or improvement. Since one single sense and the feeling of touch suffice to enable the blind, deaf, and dumb to think rationally, and since the extremely fine senses of the brute cannot accomplish this, or only to a most limited extent, it is clear that the nature and quality of the thought-

material and its elaboration in the organs of thought are of much more consequence than the quality and number of the avenues through which that material is conducted to the mind. Hence we are also in a position to correct by reflection the illusions which often happen in direct sense-perception—for instance, with regard to the size, motions, and distance of the heavenly bodies; though this is only done with the help or application of natural laws, which, in turn, have only become known to us by means of sense-impressions. The fallaciousness of the senses in particular cases is corrected by their general trustworthiness.

As a matter of fact, however, these are not so much instances of sense-illusion as of hasty conclusions not scientifically tested; the relation announced by the senses is correct, but we put an incorrect interpretation on that relation.

The assertion, frequently made by the spiritualists, that our senses may possibly only reveal a certain proportion of the outer world, or of reality, to us, and that the real universe is vastly greater than what our senses announce, is utterly arbitrary, and is, as will be shown presently, in contradiction with the main principles of the theory of evolution. We have, on the contrary, good reason to suppose that our senses give us ample knowledge, not of a fragment, but of by far the greatest and most important part, of the existing world; and our intellect has the function of remedying the deficiency, and thus completing our “world-picture,” or of deducing the reality of things from what comes under our observation. If we had a sixth or a seventh sense, the world would not seem other to us than it does, but, at the most, slightly

richer and more varied; and we might be able to perceive directly what we now only learn by inference or with the aid of scientific apparatus (for instance, the action of certain natural forces). In any case, it is inconceivable and impossible that an additional sense would bring us knowledge that would contradict the evidence of our five senses. That would be a fatal blow to the harmony of the universe, or the universality of natural law. If there are, or may be, movements in nature which we can detect neither by direct sense-perception nor by reflection or experiment, they must be related by natural law to the phenomena we are acquainted with, but may not be strong enough to exercise an influence on the structure of the organic world, and therefore on ourselves. Because—and here the theory of evolution again comes into play—man is not, as people once naturally thought, a being who was created in a moment of time, in the full possession of all his bodily and mental faculties, and thrust ready-made into the alien world of nature; he is himself a product of nature, and has gradually been raised to his present condition in intimate correspondence with the features of surrounding nature. In other words, he has arisen by gradual development from lower forms, and in constant reciprocal action with the outer world, so that his entire organisation is in necessary and regulated correspondence with nature and its manifold influences on living things. In particular this is known and scientifically proved of the origin of the organs of sense. They have, without exception, been developed by a slow and gradual formation, or a natural selection in the struggle for life, out of special parts of the skin which was provided with sensitive

nerves, under the stimulus of the movements in the outer world and their impressions. Goethe was conscious of this when he uttered that profound saying: "Did not the eye share the nature of the sun, how could it perceive the light?"

It is beyond doubt that the senses are the outcome of a sort of reciprocal action of the living substance and the impressions that outer nature rains upon it. Hence it follows that there must be perceptive organs in us to correspond to all the chief movements in nature that can affect our sensitive life; or that, in the course of the millions of years which lie behind the life of animals and men, the natural development of the sensitive life could not proceed far without bringing into existence perceptive organs to correspond to the movements of nature. We are, therefore, justified in concluding that, if such organs are not to be found, these hypothetical corresponding movements are either non-existent altogether or are too feeble and latent to provoke a reaction in the living substance. When we reflect that general sensitiveness, in the form of the sense of touch, suffices of itself to give a human being a knowledge of the chief impressions of the outer world, we find reason to talk rather of the excessive wealth than of the excessive poverty of our sensitive life. We know, indeed, that man's sense of smell, fine as it is, has been greatly blunted in comparison with that of the brute, without any great disadvantage to our perceptual life; and that blind or eyeless animals replace the loss by an abnormal development of the sense of touch.

From all this it follows that in reality we could not have any other senses than those we actually possess,

and that the forms of the organs of sense must be the same, in more or less identical circumstances, throughout the world. It is, therefore, a piece of mere imagination to suppose that if we had other senses the world would seem quite different. It could not present any other appearance to us than that it actually does. Not only is it impossible for it to *appear* otherwise, but it could not be other than it is. The well-known distinction between appearance and reality rests on an entirely wrong idea. For if it is true that—as cannot be denied—things, or the material movements of the external world, assume in our sense-organs a number of properties or features which we could not rightly predicate of them in themselves, such as sounds, colours, odours, taste, and even sensations of heat, light, pressure, etc.—a fact which was recognised by the earliest Greek philosophers, and still more clearly by Hobbes, Locke, Descartes, etc.—these things or movements are no less real on that account; in the form of presentations they constitute the indispensable groundwork of our entire structure of knowledge. Every movement, be it ever so great or small in itself, has an objective reality for us. If, as the idealists say, sensation is a purely subjective condition, corresponding to no external reality, or if, as Lange says in his criticism of materialism, the naive belief in the reality of the phenomenal world must be abandoned, then there is no such thing as knowledge, objective truth, or science; all search after truth is vain, since we can never know whether there is a reality, or, if that be granted, what kind of a reality there is, corresponding to the presentation of the senses. But it is not the senses, it is the brooding mind, that creates this difficulty. It is unthinkable or impossible that

the world should be greatly different from man's conception of it, because he is himself a part or a product of it, as we have seen, and so if the world were different he also would be other than he is. Our sensations, which are only elaborated into perceptions, and thus furnish the reason with material for further elaboration by the action of the brain, are not something complete in itself and independent of the outer world, but are occasioned by very definite and very varied movements in the environment—movements which have a definite and regular connection with those which proceed within us. As Nägeli very justly remarks, the same forces operate and rule in us as in external things; and “the apparent apriorism of our general ideas is due to the fact that the same regularity, the same logic, holds in the subject, as a part of the whole, as in the entire universe.”

The Kantist theory of “the thing in itself” rests, as Wiessner truly says, on the illusion that “behind things there is some peculiar reality that is, as it were, concealed by them, and so inaccessible to our understanding.” In point of fact, there is something behind each object and distinct therefrom—namely, other objects. But these lie within, not beyond, the sphere of experience; they are not extra- or trans-mundane, but a part of the knowable reality. The “thing in itself” is a purely fanciful thing, the fruit of metaphysical speculation, no object of experience or of exact science.

But even granting that all the preceding observations were proved to be of no avail, and that we were compelled to admit the reality of the thing in itself, it would have little value or interest for us, since it would be utterly unknowable to us, and could

never be made the basis of any kind of science. The man who is not content with science may pass on to the region of this unknowable whenever he pleases; only he must not try to persuade the world that his visions and speculations are also science. There is quite enough still to be cleared up in the province of science, without anyone feeling constrained to pass on to a world that is scientifically unknowable, or to unexplored and impossible distances; or to drink of muddy wells whilst so many limpid streams flow by.

“It is folly,” wrote Pliny long ago, “downright folly, to pass out from the world, and, as if all it contained were sufficiently known, to go in search of what lies beyond; it is as though a man were to occupy himself with the measurement of a thing and knew not his own, or as if the human mind would see that which the universe does not contain.”

CHRISTIANITY AND BUDDHISM.

It is a singular feature of our time that Buddhism, almost the oldest religious system of the world, has, for the last few decades, attracted general attention after being as good as forgotten, or confined to the studies of the erudite, for a long period. Not only have we now an ample literature concerning it, but in some of the chief cities of Europe there are small congregations, half ecclesiastical in form, of devotees of Buddha. We need not stop to consider here whether this is due to the sceptical spirit of the age, which finds itself out of harmony with the prevailing forms of religion, or to chance circumstances. It is enough that such is the case, and that this general interest justifies one in dealing with the subject in other than erudite circles; the more so as the study of Buddhism raises a question which appeals directly to the mind and the feelings of the majority of men. It is the question whether, and to what extent, the features of the Christian religion agree with the teaching of the sage of India, and whether it may not be regarded as a religious system more or less dependent on Buddhism, or one at least that has been profoundly influenced by it. Even on this specific question we have a literature which, although small in comparison with the general literature of Buddhism, nevertheless embraces all the chief civilised countries. In Germany Professor R. Seydel,

of Leipsic, has dealt with the subject, and published in two works the results of his comparative study. Dr. Hübbe-Schleiden has also published a work with the title of "Jesus a Buddhist."

In England Arthur Lillie has given a searching study of the question in a work on the influence of Buddhism on Christianity. In France the same object was attained by a work of Baron Harden-Hicky on Biblical Plagiarism by Mosaic Brahmanism and Christian Buddhism. L. Jacolliot, again, has attempted to find traces of the "Bible in India," in a very thorough but not entirely reliable study. The latest publication of this kind on the Buddhistic origin of Christianity is that of the eminent French Orientalist, Léon de Rosny (1894), whose views coincide on the whole with those of his predecessors. All these authors are especially agreed on one point—that, namely, both the Buddha legend and the Buddhistic morality have so close a resemblance to Christian tradition and ethics that we are compelled to postulate an intrinsic and historical connection. As Buddhism is much older than Christianity, it must be the latter that has borrowed. At the same time opinions vary considerably as to the real age of Buddhism—though the sixth century B.C. is pretty generally agreed to be the period of the birth of Buddhism. About the time of Christ Buddhism was spread very extensively, thanks to the ardent missionary zeal of its devotees. By the middle of the third century before Christ the followers of Buddha had conquered the Himalayah regions, Cashmir, and Ceylon. Other pre-Christian missionaries had penetrated into China, where an imperial decree of the year 64 A.D. raised Buddhism to the rank of State religion. From China it spread

northwards to Korea and Japan. It is even asserted that Buddhist missionaries had penetrated into the New World before the time of Columbus.

To the west Buddhism spread to Cabul and the Caucasian provinces of Persia. According to Wassilier, there were Buddhistic missionaries in western Persia about the year 450 B.C. From Cabul it spread to Bactria and Turkestan, from Cashmir to Thibet. Holmböe contends even (in his *Traces of Buddhism in Norway before the Introduction of Christianity*) that traces of it are to be found in Norway. Asia Minor, Egypt, and even Greece, seem to have been visited with success by the zealous followers of Buddha. At all events, Lillie maintains that there is mention on early Indian inscriptions, especially those of Dhauli, of four Greek kings who permitted their subjects to follow the religion of King Asoka (the Constantine of Buddhism, who made it the State religion in the third century B.C., having been previously bitterly hostile to it). In the time of Alexander the Great (356-323 B.C.) Buddhism must have been already an ancient religion, in the first stage of degeneration. The simple philosophic teaching of the Master had gradually given way to crude legends about his personality and the events of his life, and his Church had been disfigured by the rise of the worship of images and relics and by the infiltration of impure elements from other religions.

The connection between the Buddhistic and Christian traditions is by no means inexplicable or surprising when we consider this wide spread of Buddhism in pre-Christian times, the missionary zeal of its followers, the circumstance that even in the time of King Asoka there was such an abundant literature, such a mass

of texts and law-books, that it became necessary to make a fruitless effort to select the genuine ones, and, finally, the active communication of India with the West at that time by sea and land. We ought to be surprised if such a connection were wanting. Although we need not go so far as to say with E. Burnouf, the famous Orientalist, that the Indian origin of Christianity can no longer be disputed, and that the journey of Buddhism from India to Jerusalem can be traced from station to station, we must at least admit that there is no longer any question of the close relationship in form and contents of the two greatest and most successful religions of the world.

M. Rosny seems to assign the *role* of mediator between the two religions chiefly to the well-known sect of the Essenes, to which Christ appears to have belonged. He holds that there is a striking resemblance between the religious and other usages of the Buddhists and those of the Essenes, who, however, must not be confounded with the somewhat similar sect of the Therapeutæ, or soul-physicians, of Alexandria, described by Philo and Josephus. The Therapeutæ were distinguished from the Essenes, who taught a gloomy pessimism and opposition to civilisation, by superior education and more tolerance. According to Pliny, the Essenians formed a community of a very remarkable character. They had no money and no wives, and recruited their number by the admission of proselytes and the adoption of the children of others, whom they educated entirely in their beliefs. As they were vegetarians and very frugal, many of them lived to a very advanced age.

This vegetarianism and tendency to ascetic habits was common to them with the philosopher Pythagoras,

who is thought by some scholars to have been a disciple of Buddha, and to have derived his theory of metempsychosis from Indian sources. According to Leitner, Pythagoras may be a corruption of Bouddhagoras. At all events, it is noteworthy that the Pythagorean teaching has many features in common with contemporary Buddhistic teaching. The famous English Orientalist, Colebrooke, does not hesitate to describe Pythagoreanism as pure Buddhism. Both systems teach that the souls of men may pass into other men or into animals at death—into animals in punishment of misconduct during life. This punishment ends with a bath in the river of oblivion, which leads directly to Nirvana. Again, both sages reprobated the eating of flesh. Both doctrines culminate in an ethical system, and in both the follower is subjected to a severe novitiate.

The agreement of Buddhism and Christianity is found by the scholars I have quoted first of all in the legends which are told of the life of each of the religious founders. Each of them, Buddha and Christ, was born of an immaculate virgin, the spouse in each case having received an intimation from heaven of the good fortune of their house, and having received it in humble submission. In each case the mother's womb was transparent during the period of gestation with its unceasing miracles; in the case of Christ we learn this from a number of mediæval paintings. In each case the birth was preceded and accompanied by marvellous signs. Both saviours were hailed as sons of God. Both were greeted as the coming light of the world by three or four foreign kings, who were guided by a star. Both were revered by trees that bent in their path. Both

announce their high mission to their mothers soon after birth. Both enter the temple in their childhood, and astonish the learned priests by their answers. In after-years both prepare for their high mission by fasting and solitary meditation in the desert; the devil takes advantage of their debilitation of body and mind to expose them to severe temptation, which both successfully resist, and which both reject in the same words. After the trial angels appear for the purpose of serving them.

At a certain stage in his career Sakya-Muni was abandoned by most of his disciples, just as many of Christ's disciples abandoned him, according to the gospel of John (vi. 6, 7). Both founders answered those who sought to obey them, "Follow me." Both had a preference for the poor, the ignorant, the unhappy, and the people of the humbler class. The Brahmans reproached their great antagonist with this, just as Jesus was charged later on with choosing his disciples from the lower orders of the people. Amongst the followers of both were a favourite disciple and a traitor. The treacherous Judas is represented in the Buddha legend by the anti-Buddha Devadatta. Both Buddha and Christ have to struggle against those who possess the religious wisdom of their land—the former against the Travidyas or Veda-sages, the latter against the Scribes and expounders of the Mosaic Law.

The fame of both innovators gradually spreads through the land, and the people flock to them in crowds. The triumphal entry of Buddha into Radjagriha is comparable with that of Jesus into Jerusalem.

Both were transfigured. Both washed the feet of

others : Jesus those of his disciples, Buddha those of a monk whose body was so foul with disease that all his disciples had left him. Both promise an eternal reward to those who have faith, and prescribe baptism for the remission of sins. The death of both is accompanied by a great earthquake and by remarkable phenomena of the heavens.

Even the parables of the gospels, especially that of the Prodigal Son, are found in the Buddhist sacred books, and have, as a rule, the same subjects as those of the Christians. The working of miracles plays the same part in the founding of both religions, save that in Christianity their function is direct, in Buddhism rather indirect. Walking on water, feeding a great multitude with a small quantity of food, commanding the waves and the storm, and so forth, are miracles which were of more service to the two founders in converting the masses than the most lofty morality and the most convincing proofs. In India and in Palestine they met with equal success.

These resemblances in the lives of both founders, to which we might add many more of minor importance, are certainly very remarkable, yet they are not such as to justify us in inferring with certainty the relationship of the two religious systems. It is not at all wonderful that such legends should arise in different places and at different periods and take the same or a similar shape, or that one should borrow from the other. Their agreement in the moral principles they teach is much more important for the purpose of proving their relationship. Both Buddha and Christ engage in a struggle against a hollow and external sanctification by words, and oppose to it the principle of love, virtue, and inward holiness. Both of them

preach, in almost the same phrases, the virtues of brotherly love, gentleness, patience, forgiveness, love of one's enemies, sympathy, detachment, etc. Both urge their followers to suffer without retaliation and to return good for evil. Both would bring a law of grace for all men, under which prince and beggar would be equal. Both would help the poor, the miserable, and the oppressed; both inveigh against riches. "It is hard to be rich and to learn the way of the law," says Buddha; that is in complete harmony with Christ's famous saying that the rich will hardly enter heaven. Both preach universal charity and equality before the law, and proclaim that their teaching is for all men. "The one doctrine is for all men," says Buddha, "like the rays of the sun and the light of the moon, which shine on the whole world, on the good and the bad, for the high and the lowly"; he is continually emphasizing the power of love, so that this principle was not first discovered and put forward by Christianity. Even the famous principle of Christian ethics, "Do unto others as you would that they should do unto you," is found also in Buddha's teaching, only in a negative sense. In point of fact this principle was as familiar to the religions of Persia, China, and Egypt as that of love.

The attempt to erect universal charity to the highest position in ethics instead of mere piety was made by the Chinese philosopher Metsu in the fifth century before Christ. Sayings so purely Christian in character are attributed to Confucius and his famous contemporary Lao-tse that the Jesuit missionaries of the seventeenth and eighteenth centuries pretended, when they entered China, that the mystery of

Christianity had been revealed to the Chinese five hundred years before the birth of Christ.

With regard to the family, also, the views of Buddha and Christ are analogous. They do not expressly condemn the family, but both regard it as a craving which it would be better to sacrifice. The passions of the flesh and domestic cares are for both merely hindrances on the way to the attainment of true salvation. "Blessed are the barren," says the Gospel of St. Luke (xxiii. 29), "and the wombs that never bare, and the paps which never gave suck." Hence both bid the believer leave his wife, and separate himself from all that is dear to him. Buddha says it is better to be accompanied by no woman, even if she be a sister; Christ will only recognise as parents and sisters those who follow and believe in him. "I am come," says the Gospel of Matthew (x. 35) "to set a man at variance against his father, and the daughter against her mother, and the daughter-in-law against her mother-in-law." Christ's repudiation of his own family is well known. He bids his disciples loose entirely the bonds of family (Luke xiv. 26).

But in selecting the points of resemblance between Buddhism and Christianity we must not overlook the differences that separate them. The chief divergence of the two religions is the relation to God, who is unknown to Buddhism in the Christian sense. On the contrary, the "gods" which survived from the old Hindoo national religion, Brahmanism, are subordinated to Buddha, and themselves need redemption, as well as their devout worshippers, with song and prayer. Every man who has become a Buddha through his scheme of redemption is, like the founder

himself, "a teacher of gods and men," a "guide of the world," needing God no more to rule over him. Buddha means "the being who exists of himself" reveals himself. The Buddhist believer is not a child of God, but of Buddha.

Discipline, morality, and pure humanity or virtue are the sole commands of this remarkable religion, without god or divine worship, without cult, sacrifice, ceremonies, or prayers—in a word, without the entire customary apparatus of religions.

The Buddhistic teaching has often been described as pure atheism. The name is not entirely correct. It is rather that Buddha does not know God; he never speaks of him except in a vague, indefinite fashion. The idea of God seems to him as unnecessary for his system as it seemed to Laplace in constructing his system of celestial mechanics. On the other hand, Jesus is continually appealing to God. Moreover, the idea of a heavenly reward and of punishment is profoundly different in the two religions. According to Buddha our salvation depends entirely on ourselves and our conduct; in Christianity everything is settled from heaven by grace or the refusal of grace. The eternal fires of hell punish men for the sins of their brief life on earth; moreover, the kingdom of Satan is immeasurably vast, whilst the number of the elect is small. The fundamental idea of Buddhism with regard to release from the four evils of life, birth, sickness, age, and death, and from the pains of new-birth by entrance into the celebrated Nirvana (changed by later corruption into its direct opposite), is diametrically opposed to the Christian idea of immortality. On the other hand, the Christian dogma of the Trinity

of Father, Son, and Holy Ghost is also found in Buddhism in the shape of the "three treasures" of Buddha, Dharma, and Samgha, or God, the law, and the church—that is to say, communion of the faithful in thought, word, and deed; it has been borrowed from this source, or from the Brahmanic Trinity of Brahma, Vishnu, and Siva. The Hindoos pictured this principle of trinity in unity by the well-known image of the circle in a triangle; this image almost corresponds to the Christian idea of the all-seeing eye of God.

In the face of all this it is impossible to doubt, in spite of the very natural resistance of Christian theologians, who are determined under any circumstances to maintain the original character of Christianity as a revelation, that, in harmony with the general law of history, according to which nations and ideas only make progress with the aid of their predecessors, Buddhist ideas have exercised a direct or indirect influence on the Christian Gospels and other writings of the New Testament—with the difference that all is more natural and better grounded in Buddhism. In particular, the "Apocalypse" of John is (according to Seydel) a poetical elaboration of the early Christian ideas, which is palpably dominated by a non-Hebrew cast of thought, of West Asian origin, and which is easily explained by the constant intermingling of cults and peoples at that time, and by the above-mentioned commercial intercourse between Asia and the Mediterranean countries. India and Asia Minor especially had a good deal of intercourse at an early period, and this the Buddhistic missionaries would be certain to avail themselves of to the best of their power. But Seydel thinks that not only the

“ Revelations ” of John, but also the Gospels of Matthew and Mark, are formed on Hindoo, and especially Buddhistic, models.

This conclusion should not cause any anxiety or discouragement to the Christian believer. The real nucleus of his faith remains, whether or no Jesus was an indirect disciple of the great Hindoo sage. The truth or reality of a religious belief cannot suffer or be destroyed by the recognition of the experience of universal history, that the tree of faith has in every age produced the same or similar blooms.

CHRISTIANITY AND THE FAMILY.

It is clear from many passages in the Gospels that the founder of Christianity was an enemy of the family and a friend of celibacy. When his parents desired to see him he did not follow them, but remained in the temple, declaring that the service of his Heavenly Father was greater than his filial duty. He waved his mother aside with the undutiful words: "Woman, what have I to do with thee?" One day, when he was teaching the people, and was called by his mother and brothers during his discourse, he asked, annoyed at the interruption: "Who are my mother and my brothers?" and answered himself by pointing to his disciples. According to Luke (xiv. 26), he made the hatred of one's own parents and sisters a condition of discipleship. "If any man come to me, and hate not his father, and mother, and wife, and children, and brothers, and sisters, yea, and his own life also, he cannot be my disciple."

This example of repudiation of one's family was not without imitators. With a sad heartlessness, "for Christ's sake," children abandoned parents, parents their children, sisters their sisters, to occupy themselves better with the task of saving their own souls in the solitude of the desert and the cloister. Long

and fruitless was the journey of the mother of St. Theodosius for one glimpse of her son in his cloister-cell; he waved her aside with hard words. The same did St. Pœmenius and his brothers to their mother, who had travelled far into the Egyptian desert to see them. St. Jerome urged Heliodorus to forsake his family with the words: "If thy little nephew wind his arm about thy neck, and if thy mother, with dishevelled hair, rend her garments before thee; if thy father sink on the threshold of thy house—pass out over his body, and fly, with tearless eyes, to the sign of the cross. At such moments harshness is the only true piety" (Hieron. ep. 14, ad Heliodorum). From the conduct of Christ to his mother at the marriage feast of Cana, Bernard of Clairvaux concluded that only they who served the world had obligations to their parents; they who served God were absolved from them. Even if you see your father or mother in hell, you will "feel no trouble," according to St. Catherine of Sienna. The holy countess, Elizabeth of Thuringia, endeavoured, out of love of her Saviour, to detach her heart from her own children. "God is my witness," she cried, in her fanatical piety, "that I now look upon the dear children who came from my womb, and whom I have embraced so tenderly, as strangers to me." St. Columban forsook the mother who lay at his feet, striding over her with the words of Christ in the Gospel of Matthew: "Hast thou never heard that 'he who loves father and mother more than me is unworthy of me'?" (Matthew x. 37). The fanatical bishop, Philip of Ferrara, turned away from his parents and brothers with the words: "I know ye not." There are numbers of these examples of a

fanatical repudiation of parental and filial affection in Eicken (*History and Character of the Mediæval Theory of Life*), from whom I have taken the foregoing. This world-rejecting love of God choked even the noblest feelings of the human heart. Moreover, in the period of the persecution of heretics, the closest bonds of the family were loosened by the murderous fury of the inquisitors, in the dread of punishment and death. Brother accused brother, the wife the husband, the master his slave, of heresy, in order to escape the awful charge themselves.

Naturally, in such circumstances, celibacy was considered to be a great merit in the sight of the Lord; had the fanaticism of the clergy been able to change human nature, the world would have died out long ago. It was not simply marriage, but earthly love in general, that was condemned. But no sacrifice that the ascetical religiosity of the Church demanded so sharply opposed the natural course of human feeling as this repudiation of earthly love. No law of the Church met with greater resistance than the law of celibacy—first of all from the clergy themselves whom it directly affected. When Pope Gregory VII., in the Lenten Synod of 1074, renewed the prohibition of priestly marriage, which had been binding on the three higher grades of the clergy since the fourth century by Synodal decrees, and commanded the married clergy without exception to abandon either their office or their wives, the whole clergy rose violently against it. There were stormy scenes and attacks on the bishops and abbots who tried to enforce the papal decree. The well-known story of Abélard and Heloise is one of the best illustrations of the frightful struggles and the lamentable consequences

which such a decree involved. But the papacy and Christian fanaticism conquered, and the pious women and maidens, who had devoted themselves to God, had to be content with the love of the heavenly bridegroom, whilst pious men were rewarded with the love of the Virgin. The fantastic images, in which this heavenly love was conceived, and which represented the aforesaid lovers with all the stimulating force of sense, are well known. Even young married people went so far, the legends say, as to live in continence.

The prohibition of marriage for priests has been maintained in Catholic countries down to the present day, but the observance of the law of chastity and celibacy on the part of the laity is only found in a few isolated cases as a work of especial merit. That only shows how widely different the opinions of the modern world are from those of the early ages of Christianity and of the Middle Ages. Nowadays marriage and the family are the chief defences of private and public virtue and social order. It is even contended that they are most firm when resting on a Christian basis. Everyone may answer for himself, in the light of the preceding facts, the question whether and to what extent this contention is correct.

CHRISTIANITY AND SCIENCE.

THE great Apostle Paul, the true father of Christianity, laid down the well-known principle that "the wisdom of this world is foolishness with God," thus clearly indicating the hostility of the new religion to secular knowledge. His successors, the fathers of the Church, followed faithfully in his steps. Tertullian, the author of the famous, or infamous, "*Credo quia absurdum*" (I believe, although it is absurd), said: "After Jesus Christ all curiosity, after the Gospel all inquiry, are unnecessary." The Christian writer, Lactantius (of the fourth century), expresses himself very openly in this regard. It seems to him, in view of his Christian knowledge, quite immaterial whether the sun is large or small, whether the stars stand still or are in motion, how large the earth is, and so forth. The assertion that the earth is a globe seems to him a piece of humour; it is not worth while going into such folly. "What happiness would it bring to me," he asks (*Div. Inst.*, lib. III., cap. 8), "to know where the Nile rises, or what the physicists think about the heavens?" The fanatical church-father, Augustine (354-430), expressed himself in like manner. Science has no value for him save in so far as it leads to a knowledge of God; all knowledge that does not aim at this is useless, and only a drag on religious edification. Ignorance is regarded as a condition of piety.

Even six centuries later Damiani, the chancellor of the great Pope Gregory VII., who raised the papacy to its highest point, and caused the notorious journey to Canossa of Henry IV., declared all worldly science to be "folly and nonsense." Synodal decrees were frequently issued to the clergy against the study of secular science. This study was even declared to be a sin, and was punished. In the year 1209 the Synod of Paris passed a decree forbidding the reading of Aristotle; in 1131 the Synod of Rheims had forbidden the clerics to study jurisprudence or medicine. There are numbers of similar prohibitions. If the study of the classics was allowed here and there, this was only for the sake of *form*, not of their *contents*. Christian faith was more important than any knowledge; homage was paid outright to a fanatical ignorance. Philosophy was robbed of all independence, and was only allowed to live, as a handmaid of theology, in its *scholastic* form. In science the *deductive* method, which derived everything from God, was alone employed; the *inductive* method we use to-day was quite unknown, and the most curious errors abounded. The dissection of corpses was forbidden on account of the dogma of the resurrection of the body. Instead of medicines there were prayers and the touch of the relics of the saints. The anthropocentric or geocentric error dominated everywhere. The earth was the centre of the universe: all the stars revolved about it: man was the highest point of creation: everything had been made to serve him. The almighty Church represented the sun, the subordinate State the moon. Above the firmament was heaven or the home of the blest; in the bowels of the earth was hell. Jerusalem, as the birth-place of Christ, was the centre of the earth's

disk. There was no such thing as joy in nature for its own sake, but solely in a religious sense. Whenever St. Catherine of Siena saw red roses she was reminded of the red wounds of Christ. Even the animals were credited with religious feelings, proof being furnished by a number of most absurd stories of lions and other wild beasts, which had behaved like fawning dogs in the presence of the saints. Everywhere nature's relation to God was seen; it was regarded as a book written by the finger of God. (If it were so, indeed, there are many pages of it—such as verminology and pathology—which had been better omitted.)

Historians confined themselves to writing the lives of the saints, and the narration of historical events according to ecclesiastical and biblical ideas. The whole of history merely aimed at showing the divine aim of Christian redemption. Secular rulers were judged according to their relation to the Church. The greatest monster became a hero of virtue in the eyes of the mediæval historian if he served the Church; the best princes became monsters if they acted otherwise. Every kind of forgery and corruption was employed in the interest of the Church.

That art (poetry, painting, and sculpture) had the same character, and sought only religious subjects and the ennobling of ascetic (self-tormenting) virtues and the supposed truths of the world to come, is too well known to need enlarging upon. The person, the wounds, and the sufferings of Christ, or the Virgin Mary, or the Saints and martyrs, or abbots, bishops, and popes, the sufferings of the damned, etc., were the subjects to which mediæval art addressed itself. It was not until after the crusades that a reaction came, as, for instance, in the *Nibelungenlied* with its old

German figures of a strength far removed from religious sentimentality, the story of the Holy Grail, etc.

In view of this religious sentimentality encouraged by the Church, which could shed floods of tears over the wounds and sufferings of Christ, there is a strange perversity about the savage and pitiless fury with which those who ventured to think differently, or heretics, were persecuted, and were murdered in thousands with the most frightful sufferings, to the greater glory of God and religion. The blood of a single man gave way to a sea of blood, in which all resistance was swallowed up; his corpse became a mountain of lacerated and burned human bodies.

The Reformation at length put a kind of restriction on this horrible proceeding, but it at the same time provoked the counter-Reformation, led by the Jesuits with fire and sword, which ended in the awful thirty years' war, and devastated Germany with a flood of suffering and misery, from which it has scarcely yet recovered. Moreover, the sectarian division which was then created still continues, to the detriment of the country.

These facts and considerations are set forth in ampler proportions in Eicken's *History and Character of the Mediæval Theory of Life*. The author is no Rationalist, but a Conservative, and, it would seem, a Christian believer. That gives additional value to his impartial inquiries, which remind one of the saying of Frederic the Great that in studying history one feels that the whole world was mad from the time of Constantine the Great to Luther. Unhappily, when we consider the circumstances of our own time we have to admit that the after trouble of this madness is still far

from over, and that many years must elapse before the sun of truth and the light of scientific knowledge will wholly dissipate the gloomy mist of superstition and ignorance.

VIRCHOW AND DARWINISM.

THE aversion of the great pathologist, Rudolph Virchow, for the theory of evolution, and particularly for Darwinism, is not of recent date. As long ago as 1870 he published a paper on *The Skull of Man and the Ape*, in which, after a comparison of the two kinds of skulls, he came to the conclusion that "man could never arise by the progressive development of the ape." This was followed in 1871, on the occasion of the Congress of the German Anthropological Society at Schwerin, by the remarkable assertion that the speaker would be very glad if anybody succeeded in finding a black race with all the Aryan characteristics, and converting it into a white one, and *vice versâ*; and this was followed by the still more curious remark that the Adam of the Bible had not yet been discovered.

Since that time Professor Virchow has hardly let one of the annual sessions of the Society go by without expressing himself in the same, or similar, terms, and declaring that the question of the animal origin of man could only be decided by the direct discovery—which we have not yet been so fortunate as to make—of an anatomical and indubitable link between man and the brute. From that, of course, the daily press has not hesitated to conclude that it was all over with the *pithecanthropus* and Darwinism. Indeed,

the distinguished physician and scientist has not hesitated to proclaim his aversion for the new theory in Darwin's own country. In the year 1892 he was received with great and deserved honour by the Royal Society and other learned bodies, and gave a discourse on "Transformism and Descent," which appeared in an English medical journal, and afterwards in Germany. After repeating his familiar charges, the eminent pathologist comes to the bewildering conclusion that every case of descent in the Darwinian sense—that is to say, every deviation from the type of the parent organism—represents a pathological process.

The great astonishment which this utterance (often said to be a "pathological" utterance) caused in the world of science seems to have pricked the conscience of its author to some extent. At all events, in the speech with which he opened the General Congress of the German Anthropological Society at Innsbruck (August, 1894), he endeavoured, according to the published report, to widen the meaning of the word "pathology," so as to make his expression seem admissible. However, the whole passage has such a sophistical air about it that it is scarcely worth while going into it. An opponent of Professor Virchow's, Professor Lehmann-Hohenberg, of Kiel, says—a little too sharply, perhaps—in a discourse delivered at the Congress, and published afterwards, that this utterance of Virchow's "is quite enough to justify us in paying serious attention no longer to the great pathologist on this question."

The rest of the Innsbruck discourse shows that the speaker has no intention of making the slightest retreat from the position he has taken up. We might

dismiss the matter, and find it excusable in a man of Virchow's years, if his great scientific eminence did not give every word of his such a weight in the esteem of the general public that, if it were not contradicted, it might have a deplorable influence on their judgment. Hence the following essay.

After emphasizing the social and ethical importance of the question of man's origin, Virchow begins his attack on Darwinism by saying of the "ape theory" that it would have been just as reasonable to have taken up an elephant or a sheep theory. This is of itself quite enough to prove that Virchow has an entirely wrong idea of the theory of evolution. The descent of man from an elephant or a sheep would be a miracle indeed—inferior to none that the Church relates; in these cases the anatomic differences are so great that an evolution into human forms by natural principles is utterly unthinkable. The very word "Transformism," which Virchow accepts in his London discourse, suffices to show that there can only be question of a transformation or further development of relative forms. Then even Professor Virchow will hardly deny that the ape is the nearest related to us of all animal forms, when we include a comparison of its intelligence, consequent on the formation of the brain. Therefore, when there is question of the descent of man from an animal ancestor, our thoughts are bound to turn to one that belongs to the great category of apes. The Darwinists do not, indeed, look to any of the existing species of apes, for these are the ultimate outcome of a long line of development. No one who is half-informed in the theory of evolution will think it possible for a man to arise from the progressive development of

a real or existing ape. When, therefore, Professor Virchow, in his 1870 discourse, comes to the conclusion, after a most searching inquiry from the wrong point of view altogether, that "man could never arise through the progressive development of an ape," he utterly misconceives the real gist of the question. He confounds the individual maturity of the existing anthropoid apes with the genealogical development of the simian type in the past. It is just the same with the actual races of men to-day, which are in like manner the last links in a long chain of development, and are just as incapable of meeting or interchanging at their extremities as with two twigs or leaves of one tree, which flutter in the wind together, but owe their first origin to a remote part of the trunk. It is, therefore, quite impossible to understand what Virchow means by saying that he would be glad to see us turn black men into white, or white into black. For my part, I should not be glad, because such a change would at once upset all the laws of nature as well as the principles of evolutionary science. Even Virchow felt himself obliged, in spite of the contradiction of his earlier utterance, expressly to admit, in his Innsbruck speech, that nothing at all resembling the conversion of one race into another has ever been observed. Nor did he think it advisable to repeat at Innsbruck his earlier anxiety about the discovery of Adam's remains.

The somewhat similar demand, so frequently expressed, for the production of an intermediate form between man and the gorilla (the most man-like of the anthropoid apes, as far as the structure of the members goes), which Virchow also thinks ought to be met, is described by Oscar Schmidt (*The Theory of*

Descent and Darwinism), a distinguished zoologist, as "unreasonable." It is not a question of such intermediate forms, but of forms "which go back to a common starting-point of the actual apes and men." The demand for such a form can, says the same author, "only be raised by *dilettanti* who have no knowledge of the kingdom of living things in its entirety."

Still less intelligible is Professor Virchow's continual demand for the discovery of the original progenitor, or pro-anthropos, from which man on the one side, and the apes on the other, are descended. Even if it were never discovered (though it is possible it may be some day), it would not make the slightest difference to the firmly-established thesis of the animal origin of man.

"There is no need whatever to discover the *pro-anthropos* for the purpose of proving the descent of man from an animal ancestor which united in itself the characteristics of later men and apes. It would be very gratifying if we did discover such remains—a possibility which may be realised any day—but the discovery would prove no more than what comparative anatomy, embryology, cytology, evolution, etc., have proved long ago. Each of us has not only the *pro-anthropos*, but also a number of earlier stages, in his frame; the line of our ancestry reaches back to the spontaneous generation of life.... We, unfortunately, are too poor in fossil human remains to draw any decisive evidence from them. The true pro-anthropos, moreover, must be much older than the human remains we have so far discovered; it is probably to be sought in tertiary deposits, or in strata which are now beneath the ocean, and therefore inaccessible."¹

There is an additional difficulty in the ease with which the bones of land-animals, and especially of

¹ At the very time that Professor Büchner was quoting these words Dr. Eugen Dubois was announcing to the world his famous discovery of the *pro-anthropos*, or, as it is now called, the *pithecanthropus erectus*, at Java.—TRANSLATOR.

man, are destroyed; particularly favourable circumstances are required for their preservation. Where, asks Hohnenberg, are the human remains of the popular cities of antiquity? Syracuse, a city of half a million inhabitants in its golden days, was built on solid rock; yet there is now not a trace to be found of its ancient inhabitants in the shape of recognisable remains. Their dust has been scattered by the winds. Even in our cemeteries the human remains rarely last more than a few centuries. And what are these few centuries compared with the hundreds of thousands of years, which must have been consumed in the making of man?

When, therefore, Professor Virchow, with a very unbecoming insinuation that this is not a question of satisfying the unreasonable demand of a few, but of truth and science, says that "those who would like to be the descendants of apes keep their eyes fixed on future geological discoveries which are to bring this ancestor to light," this is only true to a very limited extent. The theory of the animal origin of the human race retains its scientific and logical character with or without this ancestor. Yet even experience, to which Virchow is continually appealing against speculation (although experience can never cover the whole ground, and is scientifically incomplete without the continual support of theory), has an important word to say in this matter; the gap which still exists between man and the brute is being filled up from day to day by new discoveries, which are either entirely ignored or depreciated by Virchow. I will only mention, on the one hand, the human skeleton found at Spy, and the skulls of Dömitz, Tilbury, Graudentz, Hartzburg, Kirchheim, etc.; on the other hand, there

is the finding of the remains of the *anaptomorphus homunculus* by Professor Cope. Further, there is our ever-increasing knowledge of the most savage of existing races through the voyages of adventurous explorers. When we add that the progress of palæontology in the last few decades has brought to our knowledge such an abundance of the most remarkable intermediary forms, between species that seemed to be widely separated (reptiles and birds, ruminants and pachyderms, the horse and the tapir, etc.), in addition to the well-known living intermediary forms between amphibia and fishes on one side, and amphibia, birds, and tetrapods on the other, that the whole province can scarcely be overlooked any longer, it must be admitted that a transition between the various orders of the primates, which are so closely related, is much easier to conceive. Man's bodily and mental nature is not built on a different model from the rest of the living world; he is a member, though the highest member, of it. His appearance on the earth must, in conformity with natural law, have been led up to by protracted evolutionary processes. The man who will not admit this has only one alternative—a return to the old theory of creation, which was accepted by educated and uneducated alike (with few exceptions) until the time of Darwin.

Creation or evolution—that is the dilemma which presents itself to every man who would form an opinion on the matter. That the great majority of people without scientific instruction, who indeed do not select opinions, but follow traditions, should cling to the former alternative is intelligible enough. But that a man like Virchow should side with the mass is not only unintelligible, but is in contradiction with

other utterances of the great scientist on other occasions. There was a time when we were wont to regard him as a zealous champion of liberal opinion and opponent of antiquated prejudices in science and politics. How has he come to adopt so retrograde a position in this question? He would not, in truth, accept this qualification. If one could ask him whether he decided in favour of creation or of gradual development, he would certainly reply that he accepted neither, but that he was, in this question, in the position of the agnostic on the theistic question; he would say that he must confess his complete ignorance as to the manner of man's origin until some convincing evidence has been laid before him. But if such evidence were discovered and put before Professor Virchow, it is most probable that he would describe it as "pathological," as he described the Neanderthal skull and every other deviation from the ancestral type. Hence Virchow is in this matter in the position of a biassed judge, who wishes to create a disadvantage for one of the parties by demanding impossible evidence. Those who find a satisfaction in such a situation will continue to appeal to the authority of the famous scientist, whilst he may flatter himself that he has put a rock in the way of scientific advance which will need some removing. Science itself will not, it is true, be arrested in its advance for a moment by the fact that people, logically following out Virchow's idea, regard the entire progress of the human race, both bodily and mental, as "pathological." The great Darwin, or the idea of evolution which he re-instated, by means of which we are now elucidating one mystery after another in nature and in human life, will eventually triumph.

Finally, to return once more to Professor Virchow, the assertion he makes in his Innsbruck speech, that modern anthropology (in spite of the social and moral importance of the question, which he himself emphasizes) is little concerned with the problem, reveals a misunderstanding of the matter which is quite unintelligible in such a man. For what could possibly be more interesting to an educated man, and especially an anthropologist, what could be more stimulating to thought and emotion, than the question of the origin of one's own race? Far differently from Professor Virchow did his colleague, the anthropologist Professor Hermann Schaaffhausen of Bonn, appreciate the importance of the question, when he wrote the notable words with which I conclude this paper:—

“To learn the truth as to the origin of man is so pregnant a discovery for all human beliefs that future ages will probably regard this result of inquiry as the greatest achievement to which the human mind ever applied itself.”

SCIENCE AND METAPHYSICS.

It would seem that the metaphysical craving in human nature, the desire to see further than nature and the phenomenal world permit, can in no wise be eliminated or restricted. How often have not philosophers or thinkers, ancient and modern, declared war on metaphysics, and with how little success ! The philosophic resignation which comes of ripe experience and reflection is not the lot of every man. The imagination soon outstrips the reason, and leads, in learned circles, to the construction of metaphysical systems ; in the unlearned to the formation of religious and spiritistic fancies.

Hitherto we have regarded the natural sciences which have obtained so signal a triumph in the nineteenth century as a powerful dam to this stream of philosophico-theological vagary ; the uniformity of the natural sequence of events which they reveal, based on a causatively related process of development, excludes of itself any such thing as a metaphysical interruption of that sequence. However much remains obscure or unexplained or defective in detail, the general result is assured, and with it the removal of all notions, new or old, which are opposed to it. It is true that such diverse views and theories may be framed as to the nature of that uniformity that they may easily be employed for the

purpose of casting doubt on the result itself. Hence those who feel the metaphysical craving strongly enough to associate it will assuredly not miss the occasion. Thus we have the remarkable situation of a number of learned voices being raised from time to time out of the very heart of science in an effort to substitute a metaphysical view of nature for the empirical view which has hitherto been used exclusively, and with success, supported by the law of causality. It would hardly be surprising to find conduct of this kind on the part of philosophers or theologians. Innumerable efforts of the kind have been made from that side without success, and will continue to be made. They do not call for serious discussion. But it is otherwise when these attempts have their origin in the very territory of science, and are supported by scientific research. To be silent on these occasions would be a treachery to that section of the educated public which, although unable to weigh the *pros* and *cons* itself, desires nevertheless to come to a conclusion as to these questions which agitate the mind so deeply. This I premise by way of introduction to an attempt to avert the irruption of metaphysics into the innermost territory of Science, which was threatened by two speakers at a recent congress of German scientists and physicians.

But before I approach the contents of the two speeches let me premise a remark on their general tendency. Both authors set out with the purpose of, as Rindfleisch puts it, breaking "the oppressive tyranny of materialism," or, as Ostwald says, "scientifically refuting" materialism. Such a purpose, if feasible, would assuredly be very praiseworthy, if there were sufficient occasion for it. But one asks in

vain how, where, and when this tyranny of materialism arose, and if the countless works and essays that have been written in the last few decades for the scientific refutation of materialism have been written to no purpose? From nearly every corner of contemporary literature comes the repeated assurance that materialism—partly from its internal failings, partly under the stress of the Kantist theory of knowledge—has long been defeated, routed, and numbered with the dead. If that be true, we cannot understand why this refutation has to be undertaken afresh time after time. We can only conclude that the dead is not dead enough yet.

When I published, forty years ago, my work, *Force and Matter*—which is usually, if improperly, regarded as the Bible of materialism—I met with a resistance so extensive and intensive that there was no question of seriously overcoming it; in view of the outbreak of universal horror and opposition, you would have thought that such a thing had never happened before in the history of the world, whereas the materialistic system is one of the oldest in existence, and has never been without supporters. The opinions, moreover, which people formed of the character of the dreaded opponent varied exceedingly. Each critic who set out for the destruction of materialism raised up a lay figure according to the measure of his fancy, decked it out with shreds of his own experience, and then belaboured it until not a particle remained. He then triumphantly boasted of his victory over materialism. In point of fact it continued to live on, and the “Bible of materialism” put forth new editions. But public opinion, alarmed by so many attacks and charges, was unfavourable to it; its spiritualist

opponents generally held the field, and it received the support of only a few isolated and somewhat timid defenders. The prefaces which I wrote for the later editions, and the restrictions which I laid down myself, did little to alter the situation. How anyone can possibly say under such circumstances that materialism ever triumphed, and that its triumph is now over, is inconceivable; and it is still less intelligible why learned writers find it necessary or advisable to return once more to the task of destruction now that materialism is dead.

Possibly these misunderstandings are due to the wholly false or inadequate idea which people usually associate with the word "materialism." They generally understand by it a philosophic tendency which undertakes to explain all the phenomena of existence by means of the properties or movements of matter without the aid of a guiding principle of reason. If such an explanation were possible, it should be acclaimed with deep gratification. It would quench the eternal thirst of the human breast for a solution of the riddle of the universe. Unfortunately, the materialistic system leaves as much to be desired in this respect as the spiritualistic. Indeed, this riddle will never be solved by the mind of man, for it can never overstep the limits of time, space, and causality which nature and experience have imposed on it, and which the universe, as such, does not know; and because, in order to solve this problem, it would have to place itself outside the universe to which it belongs. Hence all systems that have yet purported to interpret the world by one principle—whether they called it Matter, or Spirit, or God, or the Absolute, or the Thing in itself, or the World-soul, or the Unknowable,

or Will, or the Unconscious, or what not—were either wrecked by their own impotence, or were compelled to hide this impotence from the eyes of the uninitiated by a screen of fine phrases. Materialism, therefore, has no better prospect as a *philosophic* system than any of the others. The human mind, in its search for truth, must abandon empty speculation on the metaphysical or on ultimate things, and must be content to penetrate the inner causal relations of environing nature; by this means it will come to a knowledge of that uniformity which I have indicated as the end of all true research. Logic and science will at once convince it that whatever goes beyond the sphere of this uniformity rests on illusion or a false interpretation. The question of the source of this uniformity might be entirely neglected, even if the theory of evolution did not meanwhile afford us a sufficient explanation of it. It is enough to know that it exists, and that, where gaps are visible, these are not gaps in the framework of things, but in our knowledge. Nevertheless the opponents of a natural view of the world appeal frantically to these gaps for the purpose of saving their idea of a metaphysical intervention, or—it is the same thing—a miracle. But they are driven from one position to another, for the light of advancing science gradually penetrates the darkest corners, in which the belief in spirits, ghosts, or miracles, takes refuge—whether they be the phantoms of common spiritism or spiritualism, or those of science. For science, too, has its faith in miracles and its ghosts, which are sometimes able to delay its advance considerably, in spite of their unreality.

Such a phantom is the old belief in a *vital force*,

which seems to be reappearing in a new form, though it was killed and buried long ago. "Neovitalism," or the new vital force doctrine, is the theory brought forward by Professor Rindfleisch at Lübeck. This, indeed, he could only do by an appeal to metaphysical considerations—that is to say, considerations that went far beyond the nature of things as it is known to us. The unity of force and matter, which is the foundation of philosophic monism, does not need to be gathered from the nature of each of those concepts—which Rindfleisch held to be impossible; it is simply a fact, which we must accept as such, and take into account. Professor Rindfleisch finds it inconceivable that an atom, or, which comes to the same thing, the world (since it is only a question of degree), should move itself. This is certainly inconceivable for any man who does not, with the materialist, regard movement as eternal and as an inalienable attribute of matter. The distinction which Rindfleisch draws between what he calls *living* and *dead* nature was abandoned long ago. *There is no such thing as dead nature*; the difference between organic and inorganic nature consists merely in the kind, direction, and intensity of their motion. That a bird should fly differently from a stone that has been thrown is natural enough. But the fact proves no more than the movements of protoplasm that the laws which rule in the living world are different from those of what is called dead nature. The matter which is found in both, the natural forces which operate in both, are the same; and, however intricate the characters of life may be, they are neither more nor less than movements of matter under peculiar and highly specialised conditions. What room have we here for a special vital force?

The circumstance that we do not know yet, or cannot demonstrate, in what way non-vital motion passes into vital, does not in the least impair the fact that this conversion is purely natural, proceeding in a natural manner and conditioned by the general natural laws. No one who is accustomed to scientific, and not metaphysical, thinking will dispute this. Any other kind of conversion could be nothing else than a miracle, or a supernatural, metaphysical intrusion in the course of natural events. No one would think of charging Professor Rindfleisch with a belief in miracles; that would be unworthy of a physician and scientist. But he cannot be cleared of the charge of having his scientific thought overcome by a secret leaning to metaphysics. The idea which he introduces at the close of his speech, though in involved and rather obscure phraseology, is the most metaphysical of all metaphysical notions. A minister might have said from the pulpit what this scientist said, on the basis of a text of Scripture which Rindfleisch quoted. If both are right, one fails to see why science should be cultivated for its own sake, when in the eyes of him who sees all things human science is but folly. We are in God's hand, and have only to wait patiently what he decides to do with us—that is the ultimate conclusion of the wisdom which, like that of Professor Rindfleisch, seeks to throw off the "tyranny of materialism" by rushing into the opposite extreme. Neovitalism itself can only be described as an unfortunate revival of the old vitalism, which has been long ago driven from its ancient position in science by a succession of effective criticisms. Its new supporter will have no greater success.

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From another point of view, in which nevertheless there is plenty of metaphysical confusion, Professor Ostwald, the representative of physical chemistry at the University of Leipsic, undertook the discomfiture of scientific materialism at the congress. He renewed the familiar attempt to cut the ground from under it by denying, or calling into question, the very existence of matter, and substituting for it an indefinite play of thought, "It is not matter," he said, "that is the reality, and energy the accidental, but the reverse. Matter is a creation of thought which we have only constructed for the purpose of representing what abides in the ever-changing phenomena. The real thing is what acts on us—energy." Granting that the latter sentence is correct, energy cannot act on us *as such*, but only in connection with material movements, of which it is itself an expression, and which in turn provoke corresponding movements in us. Thoughts are, as we know, impossible in a thinking brain without such movements; though, according to Ostwald, it is able to think itself or its own materiality away, or to think that what is, in reality is not. That would indeed be a peculiar kind of thought, a sort of self-emasculation on the part of the brain. The word energy, or, what comes to the same thing, force,¹ is certainly only an idea formed by our brain, by an abstraction from facts, by means of which we designate the proximate cause of the movements or active manifestations perceived in nature, and of which we now know with certainty that it has, and can have, no real existence whatever; though earlier

¹ It is possible that Ostwald means by "energy" what is called "living force"; it makes no difference to our present point.

ages had a very extensive belief in the existence of such forces independently of the material world. To construct a material world with its countless marvels and entities, and its infinity in point of time and space, out of such a concept or thought-creation, is a task which is more suited to the fanatical metaphysician than the scientist, or which is only possible to the creator who produces things out of nothing by an act of will. Ostwald would say that when one receives a blow of a stick he would not perceive the blow, but a differentiation of energy. That is a convenient theory for those who deal blows, but scarcely for those who receive them. What would Ostwald say if he were to complain of such a blow, and the striker were to reply: "My dear fellow, the stick I struck you with is, on your own showing, merely a creation of fancy, and what you felt was not pain, but a differentiation of energy. You have no cause whatever to complain."

Ostwald's attitude with regard to the nature of matter seems to appeal to the well-known theory of "centres of force," which a recent anti-materialistic natural philosophy has endeavoured to substitute for material atoms. But no sound mind will ever conceive how unextended things (centres of force) can unite to form something extended, or how something extended and corporeal, such as the world is, can be made up of what is unextended and incorporeal, as force as such always is. Ostwald's view seems, when we follow it to its last consequences, to culminate in that solipsism, or denial of the reality of the outer world, which has played an unenviable part in the history of philosophy from time to time as the outcome of extreme subjectivism or transcendental

idealism, and which Schopenhauer justly called "theoretical egoism and lunacy." Ostwald, as a scientist, will have nothing to do with this; but how can he avoid the consequence, if the material world is only a thought-creation, and if the sole source of our knowledge, thought, and sensation is the perception of differentiations of energy? The whole world then becomes a chaos in the mind; it can no longer say whether what it perceives or thinks it perceives, whether even itself, is real or fictitious.¹

One is bound to come to some such conclusions when one violently sunders the ideas of force and matter, and erects a philosophy on the isolated study of one of them, without due regard to the suitability of terms to express one's ideas. A one-sided insistence on matter leads to materialism; a one-sided insistence on force, to spiritualism, with all its hurtful consequences. No reconciliation of the two systems is possible except on a monistic basis, by a recognition of the unity and inseparability of force and matter. Most probably there is only one kind of matter and one form of force, of which the various kinds of matter and force are but different modifications or phenomenal forms. As far as force is concerned this has been demonstrated by the famous discovery of the law of the conservation of energy; in time it will probably be proved of matter also. Matter and its movement are the ultimate factors to which all things may be traced, whilst they themselves can be traced no

¹ It is hardly possible here to enter on an exhaustive criticism of the sceptical theory of knowledge, which has been brought into the field, after Lange, as the chief philosophical argument against materialism. The author has dealt with it more fully in other works.

further. They are the great unknown X and Y, whose eternal and illimitable process constitutes the universe.

There is no use in fretting, as so many do, over the question what these unknown factors, or what force and matter, are in themselves. We only know them in their actual association ; to separate them into two independent entities is only possible in thought, not in reality. When they are thus taken separately they become empty and valueless abstractions from the reality of things.

It is possible that the two expressions, like the words "spirit" and "matter," represent only two different sides or phenomenal aspects of one and the same thing, or source of all things, the inner nature of which is unknown to us. If anyone wishes to call this "God," there is not much to be said against it—provided it is stripped of its theological and anthropomorphic associations, and not opposed to or set above the principle of the uniformity of nature. To prove the reality of this natural order by means of the facts which science daily brings to light, and by a logical connection of them through the law of causality—that is the aim and object of the philosophic tendency which is improperly styled "materialism." *This* materialism cannot be rejected unless one is willing to thrust out of the world, not only those facts, and science itself, but logic as well. That the latter suffices of itself to show how unnecessary it is to appeal to supernatural principles in constructing a world-system was proved clearly enough by ancient philosophy, although it did not win general acceptance. It remained for modern science to furnish the proof of the correctness of the views of the ancients, and to

reveal the world as an uninterrupted play of natural and causally-connected forces. Countless problems of life and science, which have hitherto harassed and perplexed the human mind, are now easily solved by a simple application of the principle of natural development. All that has been hitherto ascribed to supernatural or extranatural influences—the order and regularity of the universe, at large and in detail; the origin and development of the living world, both as regards body and mind, during an immense period of time; innate ideas, and so forth—is due to purely natural agencies, inherent in the things themselves. It would be just as correct to call materialism the “philosophy of evolution.” This kind of philosophy knows only one craving—the desire to bring truth to light. It does not need any artificial veil or word-screen for the purpose of concealing truth, or rendering it unrecognisable; it does not play with phrases or empty antitheses, as do the metaphysicians; it knows nothing of the countless ‘isms which spread confusion in the school-philosophy; and it does not attempt to grasp the air, or give visibility to the invisible. It is content with what we know, or can know, or need to know, and what our cognitive faculties teach us. And this knowledge leads confidently through the world; whereas the quest of any other science is like the following of a will-o’-the-wisp, which plunges the traveller in the morass. Modern science is materialistic, in its contents and its method, in the sense that it recognises no other foundations of research except matter and movement, or—to put it more succinctly—matter in motion, or moving matter. Over it we may write the ancient inscription of the statue of Neith, representing “the great mother,” or

the all-producing matter, at Saïs, in Egypt: “I am all that was, is, and ever will be; no mortal man has ever raised the veil that conceals my immortality.”

THE SOURCES OF BUDDHISM.

SINCE the venerable religion of Buddha has, in the last few decades, attracted so much attention in educated circles that Buddhistic communities have even been formed in some of the chief cities of Europe, it seems worth while to cast a glance at the sources, or predecessors, of this interesting religious system in the world of ancient Indian thought. No system of ideas ever sprang directly from the brain of its author, like Minerva from the brain of Jupiter. In every case we find obvious or hidden threads which connect later systems with earlier ones. This we find in the case of Buddhism, although at first sight it seems to be something entirely apart. Buddha, like Christ, had, in a sense, his John the Baptist in the person of Kapila, the founder of the Sankjah or Samkhya philosophy, which has been described by the learned Orientalist, Richard Garbe. It is true that there is a certain lack of clearness in the description, but the fault lies, not with the writer, but in the peculiarly fantastic and mystic character of the ancient Indian ideas. At the same time some of the most salient features of the Sankjah system, which we find later more or less explicitly in Buddhism, are very clearly presented. But the most interesting point for the modern mind is the remarkable harmony of some

of these doctrines, the fruit of mere speculation, with the results of modern empirical science.

I do not include in this category the element of the Sankjah doctrine which gives it its peculiar character, and consists in the most explicit atheism. Its argumentation is brief and simple. Creation is impossible, because a thing cannot be the cause of itself, and a substance can only come from a substance. *Ex nihilo nihil fit!* Since, moreover, every conscious action must be determined either by a selfish aim or by goodness, and both these motives are excluded in the creation of the world, it follows that the making of the world cannot possibly be traced to a conscious act. A god whose every wish is realised cannot possibly have a personal interest in such a creation. But neither can we suppose him to have resolved it from kindness, for there is so much pain and misery in the world, and a benevolent God would only have brought happy, not miserable, creatures into existence. If it is replied that the goodness of God only came into action after creation, when he saw the sufferings of his creatures, we have a vicious circle; we have creation as an outcome of goodness, and goodness as a result of creation. When, too, we regard the unequal distribution of joy and pain, we cannot acquit the creator of the charge of unjust partiality.

There are, indeed, gods, according to Kapila, beings more highly organised and happier than men. But they, like men, are, being things of time and change, subject to the iron necessity of the *sâmsara*—the eternal linking and progress of general and individual existence—and they are far inferior to the man who has, by a discriminating knowledge, won a release from the bonds of the *sâmsara*.

They have nothing to do with the creation of the world.

The true ground and nature of the formation of the world are found in the *pakriti*, the eternal, infinite, illimitable, primitive matter, out of which all emerges, and into which all sinks again. It is invisible in itself, because too fine for our senses to perceive. All the forces or qualities that appear subsequently must be contained in germ or in outline in this primitive matter. All the forms that proceed from it are subject to a periodic destruction and renewal without beginning or end—a process which has been realised countless times in the eternity of the past, and will be repeated in the eternity of the future. Now, all this—the eternal matter, so fine as to be invisible; the germs of all subsequent things contained in the primitive nebula, out of which our solar system has been developed; the periodic destruction and renewal of the various worlds; the assertion that the property (otherwise force) is not a distinct entity from its substratum, and that all things are linked together in a chain without beginning or end; finally the doctrine that impressions are made on our organ of thought and remain stored in it in latent form, that habits and features are inherited, and that the internal organ (otherwise the nervous system) is the material cause of the senses—all this is in remarkable agreement with the results and the views of modern science. They agree also in affirming that the unconscious primitive matter first comes to a consciousness of itself in the psychic principle. Moreover, the “internal organ” of the Sankjah philosophy may fairly be regarded as the equivalent of our nervous system.

On the other hand, this remarkable system entirely contradicts modern views when it opposes the psychic principle to nature as something apart, and equips it with forces which are able to paralyse the pressure and impress of matter. The soul which attains to a discriminative knowledge (the highest aim of the wise) is freed from the influence of matter ; the connection between it and matter is destroyed. It even becomes unchangeable and inactive, in opposition to matter, which is subject to eternal change. But that applies only to the higher souls which participate the highest knowledge ; lower souls remain in the bonds of matter until they at length succeed in gradually ascending to the higher stage. Hence the first result of the development of the primitive matter is the connection of all souls that have not yet got beyond their earthly existence ; the second result is the liberation of individual souls. For the few, matter desists from its creative activity as soon as they have reached the supreme goal ; it withdraws from the souls which have attained knowledge, and throughout eternity forms no new connection with them. This, however, implies no diminution of its creative activity, since the same relation continues for all other souls. The question that inevitably arises, whether a time will not come in the remote future when all souls shall have attained the goal and be freed from the bonds of matter, is answered in the negative ; the number of souls is infinite, and the cycle without beginning is not only not nearing its end, but will continue for all eternity.

This peculiar opposition of nature and the soul has led to the Sankyah system being usually regarded as an explicit dualism, whilst many see in it an idealistic

monism with a material foundation. The latter view is certainly checked by the circumstance that the Sankyah writings are decidedly hostile to the Indian school of open materialists, the Tschavarkas, who held that the mind was not different from the body. The explanation of this curious supposition of an amalgamation of dualistic and materialistic principles in the Sankyah system must be sought in the consistent pessimism which is the main feature of the system. All conscious life is pain and suffering; happiness is a mere illusion. But the worst evil of all is the necessity of a return of age and death in a new existence and the regeneration it involves, which is so prominent an element in all the religious systems of India. The complete removal of pain is the end and aim of the entire teaching—an end which cannot be attained by external, but only by internal, means. It is necessary, not only to assuage pain, but to make its appearance impossible for all eternity; this can only be done by putting an end to the transmigration of the soul. For this purpose philosophy alone avails—that is to say, a knowledge of the absolute difference that separates the whole material universe and the primitive matter it emerged from on the one side; and the soul, the true self, on the other. “When, as a result of this discrimination, the last vestige of pain is ended, man has reached his goal; in no other way can he reach it.”

In order to compass this discriminative knowledge and the accompanying relief from all the pain of existence, the Sankyah system goes on to elaborate a theory of world-development, both on the material and the psychic side, into which I cannot enter here. The final result of it is a redemption during life as an

immediate preparation for the true definitive redemption which takes place at the moment of death, when the internal organ of the wise man merges into the primitive matter. Then only begins the repose of unconscious and painless existence. But this applies only to the individual, not to humanity or the universe, in which there is an infinite number of souls. However many gods and men reach the supreme goal, the world rolls on in its eternal rhythm of pain and change.

Regarded as a profound reform in opposition to the dominant Brahmanism, the Sankyah philosophy is distinguished by its refusal to recognise differences of caste, and consequently to bar the way of salvation for any class of men. Moreover, it does not recognise any professional teachers, as Brahmanism does; every man who has attained the discriminative knowledge has a vocation to teach others. This is the more important when we remember that salvation is secured by knowledge alone, not by works. Hence there is no question of morality in the Sankyah system; this is a defect which was remedied in a remarkable fashion by Buddhism.

With the repudiation of moral works is closely connected the indifference of the Sankyah devotees to all the things of this world. The man who sacrifices this world in perfect indifference to its pleasures, and devotes himself entirely to knowledge, is compared to the flamingo, which contrives—according to a popular Indian legend—to select the milk out of a mixture of milk and water. Solitude is recommended as the chief aid to obtaining this indifference. For the rest, there is a lower and a higher indifference; the former corresponds to the effort to attain the discriminative

knowledge, the latter to the possession of that knowledge, which is then the forerunner of redemption.

Anyone who has even a superficial acquaintance with Buddhistic teaching will have noticed already the remarkable similarity of the two systems. Atheism, pessimism, cosmism, opposition to Brahmanism, abandonment of caste and ecclesiastical usages, and finally the famous Nirvana of the Buddhists—what are these but repetitions in another form of Kapila's ideas, completed by a wonderful morality? Probably the Sankyah doctrine was confined to a small circle of educated or spiritually elevated men, and unsuited for wider propagation, whilst Buddhism adapted it to the understanding of the masses, and thus framed a world-religion of so thrilling a power that it still remains, though in a greatly modified form, at the head of the religions of the world in point of numbers.

THE HEREDITY OF ACQUIRED CHARACTERS.

MR. HERBERT SPENCER, the distinguished philosopher, who was the first to enunciate the bold and fertile thought that our whole mental faculty owes its origin to a gradual elevation and accentuation of countless psychic processes, brought about by action and reaction, and beginning from the lowest stage of sensibility, and has slowly raised itself to its actual altitude in this way, says in an essay against what is called "Weismannism" that the question whether acquired characters can be inherited or not is the most important of the questions that now confront the world of science. Whether this be an exaggeration or no, certainly the question is most intimately connected with the whole problem of progress, of so much importance to humanity. How can such progress be possible or conceivable until we have given an answer to that question? It must be evident, on slight reflection, to every man who is acquainted with the facts that the Darwinian natural selection of chance variations is not sufficient for the solution. It is well known that this may lead to retrogression as well as to progress; that it is generally more or less inoperative in the higher stages of human civilisation; and that even it is incompetent to secure the disappearance of organs which have become useless and may be the occasion of numerous maladies.

It is true that natural selection is supported by quite a number of other agencies—the great principle of progressive division of labour, an ever-increasing differentiation and a striving after unity of organisation, as a result of the struggle for life, the progressive complexity of all earthly relations and conditions of existence, and finally the influence of various external and internal agencies, according to climate, locality, etc., both on the embryo and the developed animal—in causing a continual variation of the organic world on a more or less ascending scale. Nevertheless, all this does not suffice to explain, not simply organic progress in general, but particularly the advance of the human race from its lowest stage to its actual elevation. The explanation only becomes satisfactory when we adduce the force of “progressive heredity,” or the inheritance of characters or capacities acquired during life. Each individual acquires in the course of its existence a certain number of bodily or mental features, which give a distinctive character to its individuality, and transmit it to some extent to its offspring. In reality this is no more wonderful or impossible than the process of heredity in general, which brings forth from the extremely simple, microscopic germinal elements of the parents creatures which resemble them even in most minute features. The only difference is that these characters are *innate* in the one case, and *acquired* during individual existence in the other.

Here we encounter a difficulty which suffices, according to the opponents of the Darwin-Haeckel theory of heredity, to make us call in question, if not entirely reject, the latter form of heredity. This is the impossibility of forming a clear idea how and in

what way the bodily characteristics acquired during life can influence the germinal elements ; on the other hand, the reverse process, the influence of the reproductory organs on the condition of the body, is very appreciable and undisputed. However, the latter circumstance—even apart from all other reasons, or experiences of an influence of changed or morbid conditions of the body on the reproductive organs and the foetus itself—proves a very close physiological connection between the two sorts of cells, although we may not be able to form a precise idea of the nature of that connection. There have been, as may well be imagined, a number of attempts to solve by speculative methods a mystery which will not yield to direct observation, and may never be solved. But none of the theories suggested—the pangenesis of Darwin or de Bries, or the perigenesis of Haeckel, or the idioplasm of Nägeli, or the plastidules of Elsberg or Maggi, or the plasomata of Weissner, or the idioplasts of Hertwig, or the determinants of Weismann, and so on—can be established ; they are merely metaphysical speculations on the bearings of a problem of which the ultimate solution is to be found in the marvellous fineness of organic matter, or matter in general, which is beyond the grasp of our senses and our imagination. Although the germinal elements offer no visible trace of the organs and tissues of which the organism is afterwards composed, there can be no doubt whatever that the genealogical inheritance of transmitted characters, or the rudiments of all these structures, must be contained in them. It is illogical to infer the non-existence of a natural phenomenon from its inconceivability. As Professor Maudsley says, “it is a conceit of human ignorance to suppose

that a thing is impossible because it seems unthinkable to us." If we were to exclude all that is unthinkable from the range of natural phenomena known to us, there would probably be little left. It is only phenomena or alleged facts which seem to be irreconcilable either with known laws of nature or with logic that must be refused recognition; in the present case the scientifically proved fineness of the innermost constitution of matter and its internal movement forbids us to deem anything impossible. If, for instance, a cube of glass or water, the ten thousandth part of an inch high, contains, according to physicists' calculations, between sixteen and thirty-one billion molecules (compound atoms)—an assertion which Darwin used in support of his pangenesis-theory; if we are bound to admit that the smallest living things visible under the most powerful microscope contain millions of organic molecules or groups of atoms, so that we can form no idea what an immense number of the finest histological characters, invisible to us, there may be in the tissues; if, as Nägeli contends, it takes 30,000,000,000 of the smaller fungi to weigh the thousandth part of a gramme in dry air, or the simplest protoplasmic living particle, of the diameter of the fiftieth of an inch, contains more than five thousand billion molecules of albumen, and so on; the boldest imagination must fail in thinking out the possibilities which are thus suggested. How, asks Delage, in his criticism of theories of heredity in his distinguished work, *Sur l'Hérédité*, in the face of such possibilities can we think of claiming to know the details of the structure of protoplasm and its internal movement? Attempts of this kind may be ingenious or attractive, but they

have no title to scientific consideration, since they outrun the limits of the human mind.

“Into the innermost recesses of nature,” said Haller, “no created mind can penetrate.” If no two cells can be found entirely identical out of the myriads which make up the organic world, how can we conceive the innumerable possibilities of the combination of protoplasm? A certain constitution of protoplasm and the action of external agencies upon it explain all that can be explained. A change in the blood (by sugar, poison, disease, etc.) may act on the germinal cells just as well as the suppression of the latter reacts on the body and its cells—analogously to the astonishing changes which take place in algæ and lower forms of life when one puts certain chemicals in the water they are in. The fully-formed individual is the product of a number of important and indispensable factors. The constitution of the germ-plasm is only one of these factors. The others are represented by nourishment, metabolism, growth, movement, functional excitement, and external influences of the most varied kinds. Without the inheritance of acquired characters we can explain neither the phenomena of adaptation nor those of phylogenetic (ancestral) development. Without it there is no Lamarckism, nor even Darwinism, for this is reduced to the selection of chance variations. Weismann would explain everything by selection and amphimixis (the mixing of parental legacies), and has thus formed the school of Neo-Darwinism. But, with all respect for his great ability, his system is really untenable. Without the inheritance of acquired characters there can be no new parental plasma (reproductive matter), and without such more complicated plasma than that

of the protozoa there is no possibility of the origin of the higher animal forms.

So far M. Delage. We may add that the whole question is not so much one of theory or speculative consideration as of experience and facts, and the latter leave no serious room for hesitation about giving an answer in the affirmative. The matter is not finished by a bald denial or a strained explanation. How will Weismann and his followers explain, without the aid of the laws of heredity, the indisputable transmissibility of acquired dispositions to disease or malformations? Or the acquired immunity against infectious diseases? Or the tainted offspring of drunken parents? Or the cases of epilepsy in the young of animals in which epilepsy has been produced artificially? Or the well-known results of artificial selection and improvement of animals and plants? Or the gradual perfecting of the instincts of animals by way of heredity? Or the conversion of different organs by adaptation to a changed manner of life, and so many other phenomena, which I have not space to enumerate? Even the inheritance of artificially produced or casually acquired bodily defects in several cases seems to be an established fact; although they may be counterbalanced by contradictory experiences of the non-inheritance of long-practised mutilations, such as the circumcision of the Orientals, the compression of the skull of the Indians, the pressure of the foot of the Chinese, the narrow waist of women, and so forth. But these negative proofs, where the phylogenetic tendency rightly asserts its superior strength to the ontogenetic, cannot undo a single positive proof which has been fully established.

The Weismann school, the founder of which has in his recent publications given up a good deal of the crudeness of his earlier views, and granted at least "the heredity of the germ-plasm," lays stress on the fact that no clear case has been established of the inheritance of an occupation which has been practised for several generations—for instance, the practice of writing, which has to be learned afresh by each new individual. This is certainly the case, nor could it well be otherwise. Ready-made capacities, such as writing, playing the piano, artistic singing, painting, etc., can no more be inherited than ready-made ideas, impressions, or knowledge. It is only the disposition of the nervous system to acquire quickly and make progress in these capacities, talents, habits, and tendencies, acquired during life, that is inherited. To this must be referred the examples brought forward by Darwin himself of the inheritance of handwriting, or of peculiar movements of the arm and hand, or the familiar greater amenability to education of the children of educated parents, or civilised nations or tame animals, or the almost countless instances of the inheritance of artificially-induced habits in the case of tamed or domestic animals, such as the pointing of hunting dogs, begging and fetching in house dogs, running round the sheep in sheep dogs, alertness of watch dogs, etc., or the well-known inheritance of artistic or other talents in certain families, or certain national features, such as the commercial instinct of the Jew or the martial spirit of the French, etc.; or the transmission of acquired defects of speech; or the disposition to gossiping, drink, crime, and so on. Those who appeal in any of these instances to an original innateness forget that,

if the theory of evolution is right, all these things and so many others which we have not space to enumerate must have been acquired at some time in the course of natural development—it makes no difference whether this is explained by acquisitions of the individual itself or of the antecedent germ-plasm. The distinction which is drawn between these two kinds of heredity is more artificial than natural. And if the form or quality of the individual acquisition very frequently, or even generally, fails to harmonise with the form of heredity—if, for instance, drunken parents are apt to have a general deleterious influence on their offspring, through their evil reaction on the germ-plasm, without precisely transmitting the tendency to drink—it does not follow that this is *always* the case, and that the germ-plasm is utterly inaccessible to all individual influences during life. Moreover, the result is the same in both cases, the only difference being that it is reached directly in one and indirectly in the other. Innateness and acquisition during life coincide here; the difference consists merely in the fact that the action of the body-plasm on the germ-plasm is not *direct*, but *indirect*.

If the germ-plasm of Weismann were unchangeable, a natural progressive development could only be explained by re-introducing the old and long-abandoned theory of Preformation; and on that theory, at all events, the miracle is far greater than in the assumption of an action of the body-plasm on the germ-plasm. In particular, the mental and moral progress of men and other animals would be quite unintelligible, as natural selection (in which, besides amphimixis, Weismann is forced to seek an essential support of his system) does not always lead to

progress, but may just as well lead to retrogression, as I said previously; and as the struggle for existence frequently selects, or gives the victory to, mental or moral qualities which by no means serve the cause of general progress, but rather the reverse. Selection, as such, can create nothing new; it means simply a choice out of a number of fortuitous variations. Hence it leaves everything more or less to chance, whereas heredity prescribes a regular process of development wherever orderly conditions in the life of man or the animal are conducive to it. Heredity and development are, therefore, necessarily related ideas; you cannot have one without the other. Development or change without heredity would leave everything to chance, and result in a hopeless chaos, which we do not find. Heredity without development would lead to an infinite monotony, which also we do not find. On the other hand, we have in development *with* heredity a law which necessarily issues in life, movement, change, and advance—in other words, precisely what we find in the progress of nature and civilisation.

As to our own race, *intellectual* heredity, or the inheritance of the power of thought and reason, in connection with memory, imagination, judgment, etc., has long since prevailed over bodily heredity, so that our advance now lies mostly in that direction. The possibility of intellectual heredity is already proved by the well-known and above-mentioned easy transmission of mental diseases, or morbid disturbances of the thinking faculty. But even if we were without this means of proof, the daily experience of the transmission of intelligence from parents to children would put it beyond dispute. In the case of nearly every

great mind in history or actual life we can show that the parents of the man or woman had mental distinction, or that one of them at least had such distinction, even where their historical repute is not in relation to such capacity. Capacity and achievement are very different things. The name which individuals make for themselves by their deeds is not in strict proportion to their capacity; and most of the parents of distinguished men, whose intellectual pre-eminence has been discovered later on, would have remained for ever in obscurity had not their children, or one of their children, risen to fame. It is very commonly, but very wrongly, supposed that genius "falls from heaven." Miracles of that kind are not admitted at the tribunal of modern science. The birth of a genius must always be regarded as the outcome or expression of a particularly favourable coincidence of pre-existing conditions—even though these conditions are not known in particular cases.

If distinguished men do not always have equally distinguished children, apart from a number of more or less fortuitous circumstances, the defect must be generally laid to the charge of the amphimixis.

However, the force of intellectual heredity is not confined to the case of great and distinguished men; it extends to all men, and necessarily implies, in the case of civilised and progressive nations, a continuous, slow advance of the mental faculty or mental power, since each succeeding generation receives from its predecessor mental gifts which have been somewhat improved by use, experience, education, and chance acquisition. Thus we have, in a manner, interest on capital and interest on interest; so that education itself, in consequence of the enlarged capacity, has an

increasingly easy task on the one hand, but has more to accomplish on the other, owing to the more exacting demands. The source of this advance of mental power must naturally be sought in the organ of the mind, the brain, of which we know that it grows, and becomes stronger and more capable, by use and exercise, like all other organs. The human brain, as Mr. Herbert Spencer remarks, is in a sense an organised register of innumerable experiences, which are received during the course of life—or, rather, during the development of a long series of organisms, the succession of which has given rise to the human organism. The effects of the most regular and frequent of these phenomena have, in his opinion, been gradually inherited, and have risen, capital and interest, to the high intelligence which is now “latent” in the human child—that is to say, which awaits in a concealed or undeveloped condition the impressions which are to bring it to its full development.

“Thus it happens,” says the famous physicist, Professor Tyndall, in his distinguished lecture (1874) on *Religion and Science*, resuming the sum of intellectual heredity in agreement with Mr. Spencer, “that the European inherits from twenty to thirty cubic inches more brain than the Papuan. Thus it happens that faculties, as of music, which scarcely exist in some inferior races, become congenital in superior ones. Thus it happens that out of savages unable to count up to the number of their fingers, and speaking a language containing only nouns and verbs, arise at length our Newtons and Shakespeares.”¹

¹ Professor Tyndall quotes this from Mr. Spencer in his famous Belfast address.—TRANSLATOR.

Naturally, with the law of intellectual heredity we have an opportunity of infinite mental progress in man, seeing that each generation stores up in the organisation of its brain, in a certain sense, its mental acquisitions and experiences, or the psychic powers, capacities, etc., it has obtained ; and, by transmitting this organ, thus modified or improved in capacity, produces a race of still greater capacity, and with a tendency to increasing mental and moral development. Art, science, poetry, and morality, all these noblest revelations of the human mind, are like a valuable plant that has been formed by the protracted labour of countless generations, and is ever tending to higher development or expansion. Woe to the country or people which interferes with this natural process of development and progress, or, as in luckless Spain, violently interrupts it, and makes the natural evolution and growth of its mental life by heredity and acquisition more or less impossible by the elimination, persecution, or neglect of its great progressive thinkers !

KARL VOGT.

THE article on Karl Vogt in the *Brockhaus Encyclopædia* (thirteenth edition) closes with the words: "Karl Vogt, together with Moleschott and Ludwig Büchner, is one of the most ardent champions of materialism in Germany. He is also a strong advocate of Darwinism." Of this trinity of outlaws two have already gone where "the rest is silence"; the third approaches his term. Many a pious soul will breathe more easily when this episode is closed without the world coming to an end, or being substantially changed. Whether the confidence it will give will be a lasting or only a temporary feeling is a question we need not enter into here. Views and opinions, in their infinite variety and contradictions, have not to decide that; it is science, ever advancing according to inner laws, that will always, and must always, have the last word. But, besides and apart from those who toil in silence at the construction of their special disciplines, there must be others who will cast a directive glance at the whole from time to time, and, like the heralds of the strife, step forth from the peace of the laboratory into the market-place of life; who feel themselves called to extend to the whole of humanity the mental benefits of scientific progress.

Such a herald was Karl Vogt. He has had a not inconsiderable influence on his time. Although he

has always been regarded and described as one of the chief representatives of materialism, he has not written any important work of that tendency; it is only a number of occasional or parenthetical deliverances that reveal his materialistic standpoint. Moreover, it was many years before he came, through the influence of Darwinism, to admit the theory of evolution, which is the chief support of materialism (or monism); he had previously been a strong partisan of the fixity of species, and an opponent of the theory of metamorphosis. But, as this point of view was also that of the creationist hypothesis, he must, as a consistent Atheist, have felt it to be a kind of redemption when it was shaken to its very foundations by the Darwinian theory. Unlike so many of his learned colleagues, he never hesitated a moment to recognise the new truth, and make a kind of recantation of his earlier errors. He himself tells of this conversion in plain terms in the second volume of his *Lectures on Man*: "The theory of the gradual development of types from a few common primitive forms has had a new mental foundation provided for it by Darwin in recent times, though it had been previously held by a few French scientists—especially Lamarck—and the German natural philosophers, in a rather different form. I was strongly opposed to it in its earlier form. In its present form, however," etc. Finally, alluding to a similar change of views on the part of Buffon, he says: "If I may compare small things with great, I also may lay some claim to this benefit of protracted self-instruction, and consequent change of views." From that time Vogt was, as the *Encyclopedia* says, "a strong advocate of Darwinism"; though he retained so much independence of thought

that he was not a blind Darwinian, he admitted other influences besides the causes of conversion which Darwin assigned. "Many roads lead to Rome," he truly said, in a description of the Darwinian theory in the *Kölnische Zeitung*; he meant that nature, in her endless variety and complexity, rarely takes one sole way, but generally several, to reach her goal. Darwin himself perfectly understood, and openly admitted, this defect of his theory later on. In particular he acknowledges that he laid too little stress on the modifying influence of the environment and its ever-changing phenomena in the transformation of living things.

Vogt owes his reputation as a "crass Materialist" chiefly to the expression found in his physiological letters: "Thought bears the same relation to the brain as the bile to the liver or the urine to the kidneys"—a thought which might have been expressed with more refinement. Vogt's predecessor, the French physician and philosopher Cabanis (1757-1808), had expressed himself with greater refinement and prudence: "The brain is determined to thought as the stomach is to digestion, or the liver to the secretion of bile from the blood." Nevertheless, very confused, and to some extent very false, ideas as to the relation of the brain to thought had prevailed up to Vogt's time, even amongst physicians and physiologists. It was reserved for the minute study of the brain of our own times to throw clear light on the question. Since it has been experimentally proved that thought is and must be a natural movement, like all other natural movements, and that it is just as characteristic for the matter of the central nervous elements as contraction is for the matter of the

muscles, or light-movement for ether, or magnetic phenomena for the magnet, etc., we are in a position to see the general truth which lies at the root of Vogt's dictum. Thought and extension can now only be regarded as two aspects or phenomenal modes of one substance. The primitive element of all psychic processes is sensation, from which the whole wealth of thought in man and the beast has been evolved, in the same gradual fashion as the bodily structure of all living things has been built up from the primitive element of the cell.

My personal acquaintance with Vogt dates from the time when he was professor of zoology at the University of Giessen. I can say nothing of his teaching, as I had at that time got beyond the preparatory sciences, and was approaching my medical examination. However, the examination was disturbed in many ways by the political events of the year of the 1848 Revolution. Political excitement had taken such a hold of feeling that everything else suffered more or less. Vogt, also, threw himself into the movement with youthful ardour (he was in his thirty-first year at the time), and was sent by the town of Giessen, together with his colleague Moritz Carriere, as its representative at the Frankfort Parliament. At the same time he was given the command of the town-guard, which, to say the truth, had more to do in the taverns than on the field of battle, and maintained public order by means of public disorder. Still all passed off smoothly, with the exception of a street-row, in which a student was shot by the guard just underneath my window.

As I myself had the honour to command one of the "companies" into which the town-guard was divided

(it was called the "Radical-company" on account of the Radical opinions of its members), I had "official" relations with Vogt besides friendly intercourse; but I forget if I had occasion to notice whether and to what extent the military talents of "the chief" corresponded to his other gifts. In any case his laurels on this field must have been very scanty, because his Frankfort mandate soon took him out of this important sphere. In Parliament our Giessen representatives naturally sat on the left of the House, but did not decide to leave it with Hecker when it brought forward the motion to raise itself to a constitutional assembly and to pass to the organisation of the central power, and thus broke the point of the revolutionary movement. The reaction had obtained time, and had used it so well that all the fine speeches which were delivered at the national assembly which followed the Parliament were of no avail. The motion of Schultz for the raising of a "parliamentary army" might have been of some use, but that also came to grief owing to the weakness and fickleness of the representatives of the people, who were to a great extent very undemocratic. It is well known that Vogt distinguished himself there as an active, alert, and witty speaker on the Left, and received his full share of the feeling of the majority against the leaders of the Opposition. When the national assembly and the dream of unity were over, Vogt went with the "Rump-Parliament" to Stuttgart, and was one of the five "Regents"; but they had nothing to "rule," as the "Rump-Parliament" was soon dissolved by military force.

Vogt took refuge in Switzerland, and, after a series of geological studies at Nice, found a permanent place

as professor of natural history at the University of Geneva. Here he again mixed himself up with the politics of a small state, as member of the House of Representatives, but he soon wearied of it, and retired exclusively to his studies and his very fertile literary work. The most important of his writings of this kind is the one (*Superstition and Science*) against Rudolph Wagner and the discovery he had made of a "soul-substance" in the interest of faith and personal immortality. Written with mordant irony, the little work quickly ran through several editions, and is chiefly responsible for the fact that from that time the theory of a "soul-substance" has fallen into oblivion.

Personally, I did not meet Karl Vogt again after his withdrawal to Switzerland, except for one brief visit at Darmstadt. Nor did we correspond. In my collection of letters from distinguished men there is only one from Vogt, which was probably written on the occasion of a request made to him by the Frankfort publisher Meidinger to take part in a literary undertaking he had started. The letter is dated from Geneva "on the festival which brought the hypocrisy of humility into the world," but without real date. However, as I can recognise the number 25 and the letter D in the post-mark, I conclude it was the 25th of December. Vogt promises a twofold co-operation in the words: "(1) A description of the geological discoveries adduced by Volger in his *Earth and Eternity*, which I partly accept, partly reject; and (2) A fresh description of the matters treated in *Superstition* without much personal criticism and attack." He wished to be paid "at the rate of his *Physiological Letters*," for which Cotta and Ricker

had given him forty-four florins a sheet. He speaks very bitterly in this letter of Volger's "Teutomania," and his attempts to replace all the scientific terms invented by purely German names. It reminds Vogt of the similar Teutomania of old Jahn.

Vogt was a faithful and brave witness for the truth, of a kind which has few examples in every century. What he has accomplished can never be lost, and will not be forgotten by posterity, though even now we conceive many things differently from him. But even as a man he will live in the thoughts of those who knew him—as a true and loyal friend, an amiable companion, a witty story-teller, and brilliant conversationalist. His many short articles sparkle with wit, and he succeeded in masterly fashion in making the most serious scientific subjects suit the taste of the general public by skilful treatment. His talents were more or less encyclopædic, and his mental horizon extraordinarily wide. Perhaps his political gifts were even greater than his scientific. It is often said that great times make great men. But it is just as frequently otherwise; how many great men, who in proper circumstances might have moved the world, remain obscure and unrecognised. Vogt guided the bargain of his life between the two extremes, being banished from his native land and withdrawn from his true sphere of action; he may well have died with the sad consciousness that his genius would have enabled him to take a higher flight than circumstances permitted.

THE UNKNOWABLE.

It would be amusing, if it were not too tiring, to draw up a list of the thinkers who are minded to keep poor, misguided humanity under the tyranny of the phantoms of its childhood. There has been a constant effort to discover a spiritual cause which guides and controls the evolutionary process of the universe without any regard to material existence. But science knows nothing of evolution apart from that existence, and all efforts of the opposite character end in dreamy visions. Hence the familiar conflict between religious and scientific views which runs through the whole history of humanity, and increases in intensity and menace in proportion as science advances in the explanation of natural connections on the lines of the law of causality or the relation of cause and effect. It is true that attempts are constantly being made to combine the two tendencies in a more or less rational manner; but the contradiction between dogmatic theology and modern science is too great and serious to be thus artificially overcome. Hence help has been sought in another direction, and it has been attempted to maintain the province of religious faith quite free from the dangerous infection of knowledge, and work each field quite independently of the other. Science has received the greatest advantage from this severance, seeing that it can now pursue its

own way without being compelled to make a compact with religious ideas at every step. But, on the other hand, it could not maintain the desire of evoking a formal opposition or state of war against the religious faith which has been venerated for so many thousand years.

The English—a very practical people—have found a convenient way out of this dilemma, which, if rather vulnerable on the logical side, permitted their scholars to go on their way without any violation of the law of causality, and also without violating religious feelings. It is the distinction between primary and secondary causes; the scientist or scholar has only to occupy himself with the latter, without calling into question the existence of a primary cause, controlling all the secondary ones. His investigations need not extend to this First Cause; it belongs to a province which is reserved for faith, religion, and theology. In this way the English scientist has saved his conscience, without coming into conflict with the religious needs of his time—perhaps even with his own.

In point of fact, it was not possible to conceal for any time the circumstance that this theory was really only a compromise, and offered insuperable difficulties to the logician. It may be for this reason that recently, under the patronage of the famous philosopher, Mr. Spencer, and with a rather larger dose of resignation, the theory of the First Cause has given way to that of the Unknowable. The existence of the First Cause was not called into question, but it was contended that it is utterly inaccessible to our knowledge—thereby, we may note, refusing theology all right to approach its subject scientifically. In this way war was indirectly declared on theological views,

a result which had been avoided in the earlier theory. Such distinguished thinkers as Huxley and Darwin, etc., subscribed to the theory, which was also called Agnosticism, and its followers were styled Agnostics. On the occasion of my visit to Darwin at his country house in 1881 (six months before his death) he defended this position with some warmth, in opposition to the more Atheistic views of myself and my companion (Dr. Aveling). When we had discussed the question sufficiently from the theoretical point of view, he passed on to its practical side, and maintained we should gain nothing by winning over the masses to our ideas. "All this," he said, "is very good for well-educated and thoughtful people; but are the masses ripe for it?" We might have answered that the question of utility was of no consequence in dealing with truth and its investigation; that truth has never failed to be of service to humanity. But we contented ourselves with an *argumentum ad hominem*, asking him if these very questions he now put to us had not been put to him when he published his immortal work on *The Origin of Species*. Many had said at that time that it were better for humanity if these revolutionary truths were confined to the judicious few, and were withheld from the general public. New and subversive ideas have always been feared, and their publication regarded as dangerous, though these fears have always been falsified. But he himself had happily not shared that fear, and had considered the masses ripe for receiving his ideas. Had he kept silent, or only written for the scientific elect, the great progress of human thought which he provoked might have had to wait a considerable time longer, or might not have taken place at all. Thus

his own great example was an encouragement to every thinker to communicate to the world whatever he thought true.

Darwin had, indeed, already formally recognised the theory of Agnosticism. In a letter to Fordyce, in 1879, he wrote: "I am not really an Atheist. The name 'Agnostic' would be the best description of my mental condition."

It was to be expected that this point of view would not remain unchallenged by English Rationalism. An article, signed D., in its chief organ, the *National Reformer*, treated Mr. Spencer's invention of the Unknowable, with all respect for his ability and merits, as a mistake which would not further the true solution of the problem, but rather hinder it; it would lead people to think they had filled up the gap in their knowledge of the world with a high-sounding word. It may be unpleasant, said the writer, that our map of the universe contains so many blank spaces; but if this really corresponds to the condition of our knowledge, how shall we improve matters except by extending our knowledge? Not by shelving our difficulties, relegating them to an "Unknowable," but by honourable and courageous progress in the paths of rational truth and rational duty will the battle be won, and humanity be made wiser and happier.

If the English writer had been more closely acquainted with German philosophy, he might have added that Mr. Spencer's Unknowable is not new, but an old invention of speculative philosophy. It is more or less equivalent to the Kantian "Thing in itself," the Hegelian "Idea," Schopenhauer's "Will," Hartmann's "Unconscious," Du Bois-Reymond's

Ignorabimus, and so many other names which men have invented in all times to cover their familiar *asylum ignorantie* with a high-sounding title. Even the "Pakriti" of the Hindoos or the Platonic Ideas lead up to a similar process of thought, the first trace of which may be sought in primitive man's well-known dread of the Unknown, which was partly accountable for the rise of religious ideas. The broader the sphere of the unknown, the greater is the effort to make the Unknowable responsible for it; on the other hand, every advance of knowledge restricts its domain. With each step in advance of science God, or explanation by the Unknowable, takes a step backward. Perhaps the whole difficulty arises from the imperfect distinction which is made between the unknown and the unknowable. An article in the *Open Court* puts this very admirably from the monistic point of view. The unknown, it says, is by no means identical with the unknowable; our present ignorance of a subject gives no one the right to affirm that it is in itself unknowable.

Faith in the Unknowable is the distinctive feature of Agnosticism; it is also dualistic and supernaturalist. It divides the world into two distinct existences—the natural and knowable world and the unknowable or mystic region, which either lies beyond nature, or else is interwoven with it, making its clearest and most transparent phenomena seem obscure and enigmatic.

The real father of Agnosticism is not so much Herbert Spencer as Kant, who divided the world into the phenomena, which alone are accessible to our cognitive powers, and the unknowable thing in itself.

When Kant shows that our knowledge is relative,

and that absolute knowledge is impossible, he is undoubtedly right. But when, in order to save the old theology, he restricts knowledge so as to make room for religious faith, he goes too far. The existence of a thing is only possible in so far as it manifests itself; absolute existence without manifestation is non-existence, an impossibility, or a contradiction in terms. This thought lies at the root of the Hegelian paradox: "Existence and non-existence are identical."

The world does not consist of things which are shrouded in mist; natural phenomena are not the effect of transcendental causes from supernatural sources. Nature is a whole in itself; all its phenomena are connected by the law of causality, and that law is equivalent to the mathematical formula, "Once one is one," or to identity in variation. It affirms that the elementary atoms remain the same in every change of things, and that it is only their form which varies.

The law of causality, which no one denies, is also the reason why nature can be known, and why scientific research means simply the seeking of the causes of effects. There are many problems which cannot be solved yet, and innumerable things of which we are still entirely ignorant; but there are no phenomena in the world which are unintelligible *in and of themselves*. Nature is knowable, and its essence is cognoscibility; there is no super- or extra-natural existence beyond it.

The usual reply of the Agnostic to an attack on the Unknowable is that no one can explain what matter is in itself. We know what metal or wood is; but the ultimate principle of metal or wood is unknowable.

This assertion shows the dualistic character of Agnosticism. The Agnostic, or the man who makes such an assertion, regards wood, on one side, as something knowable with properties which can be experimentally established. But on the other hand he postulates behind or beyond this knowable thing an unknown entity which he calls matter. And this unknown or unknowable matter is supposed to be the cause of the knowable, which is, in this case, the metal or the wood.

The word "matter" is a collective term or a symbol, abstracting from all its various kinds; but it does not denote some mysterious entity complete in itself.

The same may be said of all collective terms; they only become mysterious when, by a misunderstanding, they are regarded as real entities beside or outside those from which they have been abstracted.

Another reply of the Agnostic consists of an appeal to the incomprehensibility of the infinite, which is equally regarded as the object of religious reverence. Even Professor Max Müller seems to agree to this in his explanation of the meaning of "religion." As a matter of fact, it is no more mysterious than any other abstraction. It is simply a mathematical or arithmetical concept or process without limit. Whether we look up into the expanse of the heavens and the milky way, or into the heart of a drop of quicksilver, we find no limit that arrests the sweep of our imagination. The infinitely small is no more an independent existence than the infinitely great; there is no more mystery in the one than in the other.

The Unknowable is a dogma in the negative faith

of the Agnostic, who clings to it as something sacred. He concludes that it must exist, because man cannot grasp the totality of nature or the last cause of phenomena. The universe, at large and in detail, is so wonderful and mysterious to him, so incomprehensible, that we are forced to believe in the existence of the Unknowable. But, as I said, nature is not of itself unknowable; it is only so in a relative sense. The Agnostic grants this, but finds that the cause of the world is unknowable. Yet it is foolish to seek a cause of the world, for the question then arises of the cause of this cause, and so on *in infinitum*. Existence is a fact, and that is all.

The Unknowable must be regarded as a personification, or at least a substantiation, of an abstract idea. Goethe says somewhere that "man rarely suspects how anthropomorphic he is."

The belief in the Unknowable may possibly, as A. Comte says, be the natural transition in the great psychological development of humanity from the standpoint of the old theological faith to scientific Positivism. The surest way to get rid of the error of the Unknowable is the establishment of the knowable. Nature with all its rich and wonderful works lies within the sphere of the knowable; to the question as to the ultimate cause of all existence there is, as I said, no answer.

The human soul has, in consequence of dualistic blunders, been regarded as supernatural, because it is elevated far above all other natural existences. Yet, in spite of this elevation, it remains a part of nature—a nature of a higher kind or order.

Nature as such is wonderful, but the most wonderful of all is that its most intricate and most impenetrable

phenomena are so marvellously simple in their ultimate causes and connections. The problems it offers us for solution are innumerable ; the field of inquiry is unlimited. But all the problems are capable of solution as long as there is question of the causes of natural phenomena. Nature recognises no Unknowable.

Thus far the English writer, from his firm monistic point of view. He may be right in all that relates to the natural connection of things or the natural order. But the final riddle of existence, over which men will never cease to wrangle, the eternal question Why ? is not thereby solved. If this riddle is denoted by the term the Unknowable, there would be little objection to the matter in itself, if there were no abuse of the term, and it were not made to support theological dogmas and metaphysical vagaries. In truth, there is great danger of such abuse, if not on the part of the theologians and philosophers, who would prefer to retain their old and more convenient expressions. I do not know whether the word has better prospects in the land of its birth than here. The principle of German Rationalism remains ever the same :

“ The Why is obvious, if the dead rise again ; and the How is as clear as the sun, when we understand the world aright.”

TRUTH AND FANCY IN HYPNOTISM.

AN old experience teaches that everything new in science, art, or literature soon leads to exaggerations, or arouses hopes which go far beyond all reasonable anticipation. This is especially the case where a mystic element is introduced, and where men's ancient belief in miracles, never wholly remediable, seems to find encouragement. What expectations and exaggerations were connected, for instance, to take an example from recent years, with the newly-discovered power of "thought-reading," until it was proved that there is no such thing, in the true sense of the word, and that the art of the thought-reader by no means passes our natural faculty of perception. Such things always recall the memorable saying of Hamlet, that "there are more things in heaven and earth than are dreamt of in our philosophy"; they remind us that our knowledge of the laws of nature is so imperfect that we do not at once call into question things that appear most marvellous. Yet an abundant and ever-recurring experience has shown that whatever is in irreconcilable contradiction with the proved and indubitable laws of nature turns out, on closer examination and scientific inquiry, to be fraud and deception. No spiritist has ever succeeded in setting aside the law of gravity, and by the mere force of his will or thought, without physical contact, moving a

chair from its place, striking a note on the piano, or removing the lightest object from its position, even with the aid of a whole troop of sympathetic believers. Those who appeal to the existence of natural laws which are not yet explored, and think they may on that ground admit telepathy, or hypnotic action at a distance, or the existence of a clairvoyant faculty, and the like, ought first to seek those laws, and give a scientific demonstration of their existence. That they can never do. They are content to bring forward alleged facts, and, as these facts cannot be explained in a natural way, deduce from them by a kind of logical somersault unnatural and supernatural causes. They do not know, or do not recollect, what a difficulty there is in the scientific establishment of the simplest fact. On a closer examination either the fact proves to be non-existent or the conception of it in a miraculous or superstitious sense turns out to be entirely wrong. If, however, the causes of the fact cannot be determined, the conscientious inquirer will suspend his judgment, and trust that in time the progress of science will bring them to light. But he will never agree to the suggestion that the law of causality has been interrupted in the event. Least of all will he do this when there is question of the table-antics of spiritist media. When, for instance, a bound man performs all kinds of comical actions behind a curtain, we cannot infer that the man possesses miraculous or supernatural gifts, or that invisible spirits come to his assistance, but merely that he is able to release himself from his bonds in some unknown way. When a table leaps about and knocks under the hands of a medium, it must not be supposed there is an invisible spirit in it

—merely because no other explanation seems to suggest itself on the spot. Or when—to reach a higher level—a clairvoyant medium succeeds, after a hundred unsuccessful attempts, it is much more reasonable to appeal to chance than to an explanation that violates all the known laws of sense-perception. These examples—and the list might be greatly extended—suffice to show how we can deal with alleged facts; though, at the same time, these have not been seriously investigated, as a rule, and mostly depend on hearsay evidence. To this belongs the whole vast province of presentiments, second-sight, dreams, apparitions, and so forth. In them we have an active play of the imagination, which exaggerates everything, and puts it in a false light. The imagination plays a more important part than the clear-thinking faculty with the majority of men, and disposes them to pay more or less attention to its wildest flights. History and every-day life furnish most striking illustrations of this influence. Think of Luther's inkhorn, the witches riding through the air on broomsticks, the miracles of the saints, the ghosts of Du Prel, and so many other spiritist phenomena.

Even science is far from being free from this prejudicial influence of the imagination. It plays a part, now in one field now in another, now in one form and again in another. It is partly responsible for the fact of different authors expressing the most divergent opinions on the same subject, or of different experiences and observations being made in the same field. When, by way of illustration, we study the literature of hypnotism, which has become fashionable in the last few decades, we are so startled and perplexed by the enormous amount of contradictory

and more or less uncritical observations and assertions that it seems almost an impossible task to cleanse the Augean stable of uncontrolled data and accumulated scientific rubbish, and extract the small kernel of truth from its covers. However, I have complied with a request to undertake the task in the interest of truth, and the reader must bear in mind the difficulty of the subject if the conclusion is not wholly satisfactory. The enthusiastic devotees of hypnotic wisdom regard all who have not made hypnotic experiments themselves for a long time as incompetent to deal with it. In reality, the contrary is the case. The judge who takes an objective and impartial view of the matter is more likely to be right than the man who has acquired an excessive, though humanly excusable, interest in it through his experiments, and especially than the man who has written a book about it. Just as happened with Dr. Sangrado in *Gil Blas*, who could not abandon his medical treatment during an epidemic, in spite of its failure, because he had written a book in praise of it.

Fortunately, an appreciation of the subject has been greatly simplified from the fact that the hypnotising physicians and writers of the Nancy school have recently decided, almost unanimously, that there is no such thing as real hypnotism in the hitherto accepted meaning of the word, but that everything—even the hypnotic sleep—depends on suggestion. Hence we have now only to deal with the idea of suggestion, though it is a difficult one to determine precisely in all its bearings. It has a much larger and wider meaning than that of simple hypnotic suggestion; indeed, the whole mental and moral instruction of humanity is in a manner latent

in it. Hence a firm distinction cannot be drawn between suggestion in the hypnotic state and in a waking condition. On closer examination the whole distinction disappears, and with it vanishes whatever seemed to be marvellous in the process. The mere fact that, according to the experience of all hypnotisers, young people of the working, military, and serving classes, who are accustomed to mechanical obedience, are the most suitable subjects for hypnotic suggestion, whereas older and better-educated people, who combine spiritual self-control with personal independence, are refractory, should have prompted the suspicion that there was question of a phenomenon in close relation to ordinary life. Even the remarkable intensification of sense-action in hypnotised subjects does not imply anything extraordinary or unphysiological, when we take into account the remarkable observations of an extraordinary acuteness of the remaining senses in the blind, or deaf, or blind, deaf, and dumb, or the equally wonderful acuteness of sense in animals (particularly of smell, in this case) or in savages.

Even the great exaltation of memory in the hypnotic state loses its seemingly marvellous character when we recall the experiences which are recorded of the recollection of extremely remote events in natural sleep or dream, and of the sudden recollection of names or persons which were thought to have been forgotten long ago. Clearly this reproductive force, which remains latent in the ordinary course of life, and needs special stimuli to bring it from the depths of consciousness to the surface once more, is stimulated in the hypnotic sleep. Possibly it is the strong diversion of mental

activity in a waking condition which impedes the return of these dream-images, whilst the simplicity and primitiveness of the psychological conditions in the somnambulist, or the sleeping condition, may favour it. It is the same with the stars, which we do not see during the day, although they are shining, because stronger visual impressions crowd their image out of our consciousness. With the return of night the stars and the dream-images return once more.

As hypnotism, through its paralysing action on certain parts of the brain, and consequently on the intelligence and will, reduces the subject in a sense to a lower psychological level, or, as Benedict says, puts him in "inferior psychic condition," similar to that of childhood or of animals whose brain has been operated on, it makes him more accessible to suggestion than in his waking condition. Suggestion may be defined as an artificial penetration, by word or gesture, of the brain of the subject in a dream-condition with a certain idea, which is to be converted immediately or later into action, without the higher psychic activity of the brain, paralysed as it is, being able to hinder this action—a process which finds many analogies in extra-hypnotic conditions. The condition of the hypnotised subject only differs from normal sleep or dreaming (which may, as is well known, go as far as somnambulism, which offers a very close resemblance to hypnotism) in the fact that the dreamer is left to himself and the impressions he received in his waking hours, whereas the hypnotised person obeys artificially-conveyed impressions. But how nearly the two states are related is shown by the circumstance that it is

easy to convert natural sleep into hypnotic in good subjects by pressure on the eye-lids.

When we consider suggestion from a general, and especially an historical, point of view, we must acknowledge that its province is as wide as its age is venerable. There is not a single side or fact of our mental life which cannot be evoked and brought into play by its means; it may be said that the old philosophic question of the action of the moral on the physical, and *vice versâ*, which the famous founder of hypnotism, the Scotchman Braid, treated in a masterly fashion, is raised again by suggestion, and that the large group of imaginary diseases and cures by the simple power of the idea or of faith are put in a much clearer light by it. In reality, every practising physician is an involuntary suggester from the first moment of his activity, since he seeks to influence his patient, partly by soothing assurances of the harmlessness of the malady, partly by inspiring faith in the efficacy of his drugs or his treatment, partly by personal force. It may even be said without exaggeration that the whole of education and pedagogy, and therefore our whole manner of being and thinking, depends more or less on suggestion in the waking condition or on a half-hypnotic suggestion; because the condition of the brain in childhood and youth is in many respects similar to that of the hypnotic subject, and is much more determined from without than from within. The child and the young man believe what they are told; experience of life, or the second nature which social life builds up in us, comes in time gradually to rectify the naïve credulity of youth. But it is a matter of experience that the impressions received in childhood

and youth are by far the most important, and more or less dominate the whole subsequent life as a rule ; and that comparatively few people are able to emancipate themselves in after years, by their own reflections or their own mental force, from those impressions sufficiently to form independent convictions. Whole generations may in certain circumstances be hypnotised by one man of genius, who can, by the power of his discourse or writings, more or less determine the whole tendency of his time or nation. We may divide the whole of humanity into two great categories, the hypnotisers and the hypnotised, the latter, of course, being much the larger class. In the same way we can understand the gigantic power of ecclesiastical ideas or dogmas, which, in spite of their intrinsic contradictions, are so deeply impressed on the minds of the young that they retain their tyranny more or less in after years, and resist all the attacks of reason. Dr. Liébault, head of the Nancy hypnotic school, very rightly says in this connection :—

“People acquire certain ideas about morality, politics, religion, the family, the race, and so on, without perceiving it, and fill their minds with the ideas which pervade the surrounding atmosphere. There are religious or social principles which are irreconcilable with reason and sound human intelligence, and yet they are believed, and even regarded as mental treasures, merely because they were the beliefs of our fathers, and the most irresistible instincts are transmitted from father to son. No logic can disturb them, because they have become in a manner one with the personality.”

All this, and much besides which I cannot go into here, proves that there is no definite line to be drawn between waking and hypnotic suggestion, that one passes into the other, and that therefore the well-known eagerness of the fanatical spiritists to enlist hypnotism in the interest of their theories brings one

to the world of mare's nests. There is nothing in this province which does not proceed on natural lines, and cannot be explained as such. The hypnotic state merely developes the normal suggestibility, to which we are all more or less subject, to an extraordinary extent or in an extraordinary fashion; and there is every imaginable condition between that of perfect wakefulness and that of a one-sided concentration of consciousness in the somnambulist. How many men pass their whole lives in a semi-somnambulist condition, in which they are almost always led by suggestion or external impulses. All the assertions of the development of higher mental powers in hypnotised people have proved to be false on careful examination, or else, where there seemed to be such a development, the real connection has been established—as in the case of the servant of a Hebrew scholar who gave out Hebrew texts when in the hypnotic state. It is never possible to evoke by suggestion an idea which is above the natural capacity or normal level of the subject. Thus, for instance, you cannot make preachers or barristers out of people who have not the gift of speech, or make a subject speak a language he has not learned, or describe a thing he has never perceived by his senses, and so on. All is perfectly natural, even where we cannot at once recognise the natural sequence; there is no more encouragement for the spiritist here than anywhere else. Science, however wonderful and apparently enigmatic the things it brings to light at times, never departs from the eternal and irrefragable laws of nature, which form and compact the macrocosm as well as the microcosm according to the supreme law of causality. Everything in the world proceeds in a natural and,

as a rule, simpler manner than we care to admit, because long ages of ignorance have hypnotised the human brain so profoundly with illusions of all kinds that it may take an equally long period to get rid of them.

Now that we have determined our general attitude on the question of suggestion, we come to deal with it in detail, and to distinguish between fancy and truth, error and knowledge, in what is alleged concerning it. On account of the great importance which hypnotism—apart from its scientific importance to psychology—has obtained in its medical and legal aspects, and the large, probably very much exaggerated, hopes which are associated with it in regard to therapeutics, or the healing of maladies, such an inquiry has a value which is only comparable with its difficulty. In spite of this difficulty, I shall endeavour to deal with it in the following paper.

It is a very remarkable admission of almost all hypnotisers that *the true basis of all hypnotic phenomena is in the will of the subject*. The Abbé Faria first drew attention to this in 1814, expressing the conviction that there is no magnetic fluid (which was still generally believed in at that time), and that a foreign force is not necessary to produce the phenomena; but that the whole process may be traced to the will of the subject—in other words, is subjective. A number of French physicians adhered to Faria's opinion, and it was scientifically established in recent times by Dr. Liébault, the head of the now leading Nancy school. He proved that a psychic influence on the part of the hypnotiser is the chief factor, and he is thus the founder of modern suggestive therapeutics.

Hence willingness to be hypnotised on the part of

the subject is a condition of the inducement of the hypnotic condition; the attempt is unsuccessful if the person sets his will against it, or deliberately resists the feeling of increasing weariness. On that account sceptics, men with a pronounced spirit of opposition, realists, and people of a sarcastic nature, cannot be hypnotised, or only with great difficulty; emotional, tender-hearted, and sensitive people, and idealists, have a special disposition for hypnotism. It is usual for men—except the few who are accustomed to independent thought—to allow themselves to be influenced by the ideas of others, and to believe a good deal without conscious reasoning; and a physiological or psychological effect that is thus expected has a tendency to actually set in. It comes to this, therefore, that the subject understands perfectly well what the experimenter wants, and knows, or thinks he knows, what he is doing. “It is certain,” says A. Moll in his standard work on hypnotism, “that the effect only takes place when the subject has an idea of what is to happen. When, for instance, in advanced hypnotism the experimenter alone can provoke muscular contractions, the stimulations of other persons being without effect, or when the subject only hears or feels the man who has hypnotised him, and quite ignores others, such a proceeding is quite unintelligible without a division of consciousness, or without admitting that most or all of the hypnotic phenomena are of a psychic character. Even M. Hirsch, who has himself conducted many experiments, is of opinion that ‘the subject only *thinks* he sleeps and has an illusion of sleep, *but does not* really sleep.’ ”

This admission is of the first importance in an

examination of the hypnotic phenomena. It reveals a *subjective* element in them, which cannot be scientifically controlled, and may thus occasion the wildest illusions. To this must be added, to increase the confusion, the subjectivity of the experimenter or observer, which also is subject to no other control than his own. Thus we can understand, from the concurrence of these two subjective factors, the innumerable confusions, contradictions, and divergences we find in the work of various observers or in the results they allege. Whilst one found only one or two persons in a hundred susceptible of hypnotism, others succeed with 30, 50, 70, 80, even 90 and more per cent. of their subjects. Whilst most experimenters have found that hypnotic susceptibility increases with the frequent repetition of the experiment, others are supposed to have observed the contrary. Some distinguish three, six, or even nine degrees of hypnotic sleep; others find that there are all possible stages, and that it would not be difficult to distinguish a hundred different degrees of hypnotism. Whilst some observers find hysterical and nervous people especially good subjects, others find the contrary, and would rather experiment on robust, full-blooded persons. Even with regard to the phenomena observed during hypnotism the reports of the observers vary exceedingly. There is the same variety in their interpretations of the phenomena, particularly with regard to the manner and extent of the psychic division; more varied still are their opinions as to the danger or harmlessness of hypnotism. Whilst some fear an excitation of the cortex of the brain, others maintain that the action of the cortex is suspended. Some take offence at the mystical

character of hypnotism, others find its great healing value precisely in this. At one time it is admitted that there is hyperæsthesia of the sense-organs in the hypnotic condition—which would explain many difficulties; at other times the contrary is asserted; and so forth.

There is only one point on which they are pretty well agreed, although it is a point which is not calculated to inspire confidence. It relates to hypnotic education or educability—to use a term which frequently occurs in hypnotic literature—hypnotic training. Hypnotic subjects, with few exceptions, are not found ready-made; in order to have them thoroughly compliant, they have to be educated, drilled, or trained.

The word “training” may seem too strong, but it is really borrowed from the authorities on hypnotism. “The question of training,” says Moll (and others), “is extremely important. As the hypnotic conditions are apparently so diverse, many have suspected pretence. The diversity is really for the most part the effect of different training. The training is the chief source of the experimenter’s faults, because the subject is disposed to follow his intentions, and so unconsciously leads him astray in the end. Through the training the subject is apt to have a presentiment of the experimenter’s will. Frequently advanced hypnotism only sets in when a certain training has been given in a number of *séances*; moreover, the training makes the hypnotism not only deeper, but also set in more rapidly.” Forel (in his *Hypnotism*) admits that every subject is weak and obliging, and seeks to divine the views of the hypnotiser in order to follow him. He thinks that a zeal for the operation

is an important factor on both sides. He then speaks of taking susceptible persons "by surprise," and says a practised experimenter is able to devise all kinds of tricks for the purpose of breaking the resistance of a refractory subject. There is quite a formal process of breaking-in to go through, and a number of methods to be applied, to attain the desired end. It is easy to understand that this gradually paralyses the resistance of the subject. When Moll tells us he sometimes has to make *forty* fruitless attempts before reaching a result, we feel constrained to think that the poor fellow who was tortured forty times at length made a virtue of necessity, and abandoned his will to the experimenter. And when another of Moll's subjects, who had been told by suggestion that a tiger was present, admits, on awakening, that he only said "yes" for convenience, but saw no tiger at all; or when Moll admits that a hypnotised person to whom it was suggested that a towel was an enemy made an attack on it, but refrained from attacking a person present who was indicated as an enemy; we can only conclude that in these cases fancy and truth approach very close to each other.

Benedict (in his *Hypnotism and Suggestion*) very rightly attacks artificial or deliberate training for hypnotism, as it is practised by the majority of experimenters. He openly calls it "immoral," and proves that a scientific control of such experiments is impossible. We are bound to agree with him when he declares that all experiments on mediums, or artificially-trained and practised subjects, have no scientific value whatever, and says that, if a really critical standard were applied to the vast accumulations of cases in modern literature, at least ninety per

cent. of them would have to be removed from the category of facts. Only experiments on impartial individuals, unacquainted with the mysteries of hypnotism, can claim a probable value. This is especially true of the female sex, which supplies by far the largest contingent to the army of subjects, particularly mediums, and who are so apt to be influenced by the thought of becoming interesting.

Numbers of striking instances show to what an extent even distinguished scholars may be led astray by the comedies of these mediums. When, a few years ago, sensational reports were spread by the English press of the remarkable success of Dr. Luys, a physician and medical writer of repute, in his hospital at Paris, a London physician, Dr. E. Hart, was induced to go and study the events on the spot. He succeeded in proving that Dr. Luys had been grossly deceived by his subjects. Nothing shows this better than a very badly-written letter of one of the best subjects—a woman—to Dr. Hart, in which she boasts that it was easy to produce in her all the classical stages of hypnotism (which she enumerates with no slight knowledge), including clairvoyance and thought-transference.

The letter was elicited by jealousy of a younger colleague, whom she threatens to cut out by her ability, and who had been, she said, her own subject for eight months. She calls her a miserable actress and impostor, who has learnt all she knows from her, and offers herself for experiments. Dr. Hart gave a full account of his observations in the *Nineteenth Century*, and his paper was afterwards published separately (London, 1893).

The famous psychic investigator, Krafft-Ebing, of

Vienna, whose experiments with the medium, Caroline P——, and her hypnotic transference into earlier periods of life or the eliciting of earlier personalities, created such a sensation a few years ago, seems to be another victim of these impostors. This Caroline P. was a young woman of thirty-three years, who had been frequently hypnotised by a “noble” amateur during the preceding ten years, and could not on that account be taken as a purely scientific subject of experiment. We need not determine whether Herr Benedict is right or not when he says that his colleague, Krafft-Ebing (who seems to have withdrawn in the meantime from the scene of his delusions), has “no idea of the cunning, hypocrisy, and dramatic instinct of women.” At all events, this estimate is not easily reconciled with that of Moll, who thinks Krafft-Ebing “a very objective investigator.”

At the same time it must not be thought that all is deception in the performance of mediums. It is possible that profound disturbances of consciousness may take place in them, which are connected with an abandonment of will to the hypnotiser. But there is an extraordinary temptation to pass on into the region of comedy, especially where the social condition of the subject favours a subordination to the will of the hypnotiser. After my own experience in a series of odyllic-magnetic experiments in the 'fifties at the Tübingen Hospital, with Professor Rapp and Dr. Ranke, I was able to show that all hypnotic experiments made on the inmates or servants of the hospital (and they were numerous) were devoid of scientific value. People of this kind are so anxious to please their superiors and make themselves interesting to them, and their intelligence so utterly loses its

independence, that you can get them to do anything. They very soon guess what you want or expect of them, and meet you half way ; it gives them pleasure, amusement, and a certain satisfaction to their vanity. Moreover, the excitement of their imagination, not properly kept in check by the understanding, plays an important part. Not less is the importance of the simple obedience of persons of particularly weak mind or will, which they cannot really account for themselves. Moll, in spite of his prejudice and credulity, admits, *à propos* of the innumerable "stories" which are current in literature, that the passage from pretence to hypnotism is so gradual that even an experienced observer may be deceived, and that it is often impossible to determine where pretence begins or ends. How many subjects act, not with a view to deceiving the experimenter, but simply from a desire to gratify him ! Moll even says that we must not credit it if the subjects say after the experiment that they only pretended, whereas they had really been under constraint.

But it is most difficult of all to discriminate in hypnotism between fancy and truth, imposture and self-deception, imagination and reality, in the province of the effect—partly physiological, partly pathological, partly psychological—of suggestion on the organism itself. If we were to take literally all that is said in this matter by different observers, we should have to admit an action of the psychic on the physical which puts in the shade all that has hitherto been done, and which, if it were established, would open out extraordinary possibilities in the domain of medicine. Not only the most violent pain, such as toothache, is supposed to be cured almost instantaneously by suggestion,

but even physiological functions, such as bodily temperature, and certain excretions, such as menstruation, defæcation, and micturition, are supposed to be influenced, arrested, or stimulated at will. Hæmorrhage and diarrhœa are said to be caused or arrested. Reddening of the skin, perspiration, cold shivers, itching, goose-skin, trembling—even blisters, burns, and local hæmorrhage from the skin, bloody tears, and bloody sweat, are said to have been observed as a result of hypnotic suggestion, or an hypnotically stimulated imagination. Hunger and thirst are supposed to be excited or quieted in the same way. Not only all kinds of nervous disorders, but even deeper-seated maladies, such as emphysema, severe asthma, dyspepsia, rheumatism, dipsomania, and insomnia, are supposed to have been produced by suggestion. Definite dreams, the forgetting of a language that has been learned, catalepsy, changes of age and personality, changes into animals (lions, tigers, dogs, etc.), with corresponding behaviour—in a word, illusions and hallucinations of every, even the most ridiculous, kind are supposed to be produced by suggestion. Young ladies are changed into their drunken fathers or uncles, or made to strip themselves with unconscious immodesty. “I caused,” says Florel, “some long-deceased relatives to appear post-hypnotically to one of my subjects, and she entertained herself with them for a long time. Others I caused to walk on the sea, like Peter, or on a river. I changed others into hungry wolves and lions, and they rushed on me barking (!), and tried to bite me. On one occasion I was bitten until the blood flowed (!). I changed a man into a young woman, and he began to think of menstruation ; another time I changed a girl into an

officer. In the case of good (!) subjects speech and writing are changed in proportion when it is suggested that they are children."

No less wonderful are the results which Moll attained with his subjects: "The hypnotised thinks at one moment he is in my room, and the next moment he fancies he is lying in bed, or swimming in the water. At one moment he believes he is ninety years old, and in the next he returns to his tenth year. He thinks at one time he is Napoleon I., and the next minute he is a waiter, a dog, and so on."

In opposition to these experiences, in which, as Florel says, the experimenter plays on the subject as on a piano, others confess that the hypnotised persons often fall out of the part they are playing, and that you cannot suggest anything to them which is out of keeping with their character and general thoughts. A good Catholic, for instance, can never be induced to do or say anything which conflicts with his faith or subjection to the Church. You can never induce a peaceful or timid man to make an attack on others, or by post-hypnotic suggestion compel a man who enjoys life to jump into the water the next day, or, by the same means, cause a vain man to do something in his waking condition which is entirely opposed to his vanity, and so on. On the other hand, the most stupid and ridiculous actions, for which no particular resolution is required, such as putting a flower-pot on the sofa, dreaming of the devil, going to sleep or awaking at a certain hour, embarrassment, meaningless laughter, disarranging things, and so on, are readily produced by post-hypnotic suggestion, without the subject being able to give an account of his action. Nevertheless, the temptation to make pretence is

greater in the case of post-hypnotic suggestion than in other forms of hypnotism. When, for instance, a person post-hypnotically dances a polka to a tune which he is supposed to hear ; or when, on entering the physician's room a week afterwards, he cannot speak a word, or repeats a certain phrase, because this was suggested to him a week before ; or when, for the same reason, he has forgotten his name ; or when hypnotised people converse quietly together after the physician has left the room ; it is very difficult in such cases to think of anything else than a deliberate *obsequiousness* or submission of the subject to the will of the experimenter, or an auto-suggestion (self-hypnotism) in favour of the experiment.

To sum up all that has been said, we come to the conclusion that in this department of knowledge imposture and confusion are possible and inevitable to such an extent that we can scarcely draw the line between truth and fancy, imagination and reality. In particular, the innumerable cases and reports of various observers, when they have no independent support, have, as I said, no weight whatever of scientific proof. Moll (and others) closes his work with the hope that people will not allow themselves to be led away by any authority into accepting facts without proof. Yet he himself sins most grievously against this rule by gathering from all sides a mass of unproved and uncontrolled observations without further inquiry, and does not hesitate to appeal to such alleged authorities as Du Prel, or Leixner, or the London Society for Psychical Research. He even goes so far in his prejudice and credulity as to speak with some doubt and indecision, instead of giving them for what they really are, of things that are

physiologically and physically impossible, and as to which no honourable scientist can have the slightest doubt, such as clairvoyance, telepathy, telepathic therapeutics, magnetic rapport, the magnetic fluid, and so forth. He might have taken an example from the famous founder of hypnotism, Braid, who cleared the system of all its fantastic and unscientific additions, and showed, in his excellent work on the influence of the mind on the body, what an important part is played in these things by imagination, the instinct of imitation, and nervous excitement. He expressly states that he had encountered nothing in his experiments that could not be reconciled with the recognised principles of physiology and psychology; neither an indication of higher inspiration nor supernatural powers, but merely an exaltation of natural capacities, was to be found in the hypnotic condition. "A clairvoyant," says Benedict, "never sees anything which she has not seen before. A thoughtful psychologist will scarcely ever be at a loss to explain a striking phenomenon or unmask a fraudulent clairvoyant who likes to pass herself off as a 'superior being.'" Even Florel, who is not particular to a little credulity in hypnotic questions, speaks with reserve on these matters, if not as clearly as we should like.

In this state of things the greatest caution is necessary, as Benedict rightly says, to separate truth from fancy in hypnotic experiments. This is scarcely possible as long as an experimenter works alone, as the subjective element on both sides cannot be satisfactorily controlled. To bring out the latent nucleus of truth in all its purity and clearness there should be a commission of experts, or informed and utterly

impartial men ; and they should, paying attention to every possible precaution against imposture or self-deception, and excluding all previously trained and practised subjects, hold an inquiry similar to that which the Paris Commission held on mesmerism under Bailly in 1784. Such an investigation would have not only a scientific, but also an almost greater practical value, in view of the importance which hypnotism has assumed on its medical and legal sides. For if it is possible to *get rid* of diseases by suggestion, as the hypnotisers contend, it should also be possible to *induce* them by the same means, even eventually to cause death, directly or indirectly. Such a power placed in the hand of a physician with regard to his patients must involve the gravest danger for them, and prove a standing menace to society in general. This danger is still greater, if crimes against life or property may be suggested post-hypnotically in such a way that they will really be carried out afterwards without the subject knowing the reason. If post-hypnotic suggestions are possible when there is question of actions or omissions which are easy to perform, it is difficult to see why they should be impossible as regards more important actions. Attempts have often been made, though without success, to extenuate or exculpate criminal conduct on the ground of post-hypnotic influence. Hence a scientific determination of what is true or untrue in these matters should be demanded, not only in the name of science, but also in that of humanity, medicine, and jurisprudence.

I said at the beginning of this essay that everything new and marvellous was apt to lead to exaggeration and precipitation at first, and that it is

only the more tranquil later period that can sift the wheat from the chaff, truth from fiction. This period does not seem to have dawned yet for hypnotism, as the mystical character that dominates our time is only too well calculated to foster its excesses. But the day cannot be long delayed when the psychological gain from this group of phenomena, reduced to scientific formulæ, will be more useful to our posterity than it has been to us, who still suffer from its exaggerations and have to fight against them.

THE DISTRIBUTION OF BLOOD IN THE ANIMAL AND THE SOCIAL ORGANISM.

THE whole life of the animal and human organism is concentrated in the blood. When Menenius Agrippa, in his celebrated parable, represented the stomach as the centre of the life of the body, receiving all the food from without, and distributing it to the various organs, he might have chosen the blood for the purpose with more effect, but less obviousness. No kind of food can give strength and life to the body unless it is first converted by familiar processes into the nourishing stream of the blood. The action of the heart drives this stream through innumerable canals or membranous tubes to every—even the smallest—part of the system, for the purpose of maintaining, on the one hand, their constant change and renewal of structure, and on the other of removing the waste products of the life-process. These processes have been called by the name of “metabolism,” and it is now well known that the health, strength, and energy of the body depend most of all on the proper and unimpeded continuance of this metabolism. Nothing more quickly brings it to an end, and causes death, than an excessive loss of this invaluable vital fluid. But even mere obstructions in its ceaseless ebb and flow involve grave danger to health and life. A little coagulation or clot forming

in the blood-vessel may cause instantaneous death. Even a simple obstruction in the peripheral distribution of the vascular system, or an accumulation in the wrong place, is extremely injurious to health, and may sooner or later lead to disease or death. The brisker the exchange between centre and periphery, or between the general reservoir in the heart and the various parts or organs, the stronger and more energetic is the entire system.

There is just the same, or an analogous, relation between the whole and the parts which constitute it—the individuals—in the social organism. It is true that some ill-informed people might object that there is no resemblance between the individuals that compose the State, with their profoundly differing natures and aims, and the parts of the bodily organism, so thoroughly subordinate to the whole. But modern physiology has, with the aid of the cellular theory, revealed an independence of the parts of which we had formerly no suspicion; it has shown that nearly every one of the innumerable cells or groups of cells which make up the system has its own life, only limited by the purposes it has to fulfil in the life of the whole. This goes so far that a distinguished medical man of the time seeks the nature of disease precisely in a modification of the cells, and thinks such modification as is found, for instance, in the cancer-cell may lead to the most baneful and menacing growths in one or other part of the system. Each organ, again, has its special individuality and place within the whole, but must not give a preponderance to this place to the detriment of the whole. Too large a heart, liver, spleen, etc., is just as prejudicial to the life and health of the whole

as a railway monopoly is, for instance, in the social organism; or an excessive growth of cells in a particular part of the body is just as dangerous to its health as an excessive accumulation of private means, withdrawn from commercial circulation, is to the health of the social body. The whole secret of health in both cases consists in a normal equilibrium between centre and periphery, the interest of the whole and of the various parts.

It cannot be questioned that the State does not consist of a mere sum of individuals, or, as Lassalle thought he could conclude from the Prussian taxation-returns, of a great association of the poor and needy classes, but of a number of different and unequal parts, organs, tissues, etc., arranged as a whole. In such an organism a single man, or a single stratum of society, or the combination of a few individuals in the pursuit of common aims, may attain a greater importance than hundreds and thousands of ordinary citizens. Even simple possession gives the owner a far greater influence on the life of the whole than that of the ordinary citizen; it is just the same with intelligence—the owners of it outweighing whole troops of the masses.

This distribution of social influence might be considered just if we could say that it was rooted in the nature of things, and that in this distribution capacity and merit alone gave pre-eminence. Unfortunately, this is so far from being the case that one feels more disposed to say the contrary is the rule. This is true, at least, of the possession of property, moveable or immoveable; as is well known, it oscillates between the utmost extremes, and leads to an inequality of the citizens which runs counter to the interest of the whole.

This is the point where the analogy of the animal and social organisms is most at fault, to the prejudice of the latter. In the one case all works together in unison for the good of the whole, whilst unnatural hindrances or local swellings immediately cause disease and death. It is, at least in all the higher organisms, an ideal form of collectivism ; in lower organisms the independence of the parts is so great that when you cut one into pieces it continues to live. In the social organism, on the other hand, individualism plays a part which is prejudicial in many ways to the interest of the whole. The large—sometimes wholly immoderate—possessions of private property, with a proportionate private influence, resemble the stoppages or abscesses in the animal organism—with this difference, that they do not lead either to recovery or death, as in the animal, but continue untouched, and protected by the law, to the prejudice of the whole. Instead of returning to the whole, or to the blood of the social organism, in a ceaseless interchange of fluid, or metabolism, what they have received from it, they store it up in special places, withdrawing it from the general circulation, or else, through the slavery of interest, remaining idle themselves and making others work for them. When people set about showing the great advantages of capital they should be careful to distinguish between private and collective capital. However beneficial the latter may be for the whole, that cannot be said for the former. It is never directed to the common good, but always used for private advantage, and is only put out when a private gain is in sight. The consequence is a continuous withdrawal of blood for private ends, which greatly weakens the whole. When the workers and their

leaders declare capital to be their enemy, and declaim against it, they are extremely short-sighted. Capital is not their enemy, but their best friend—or might be ; if all had capital, there would be no question of anything but its beneficial character. Private capitalism is their enemy in so far as it forces them into its private service without a corresponding return. A juster distribution, or rather employment, of capital in the interest of *all* would probably content everybody, and solve a great part of our heavy social problems. Not, indeed, that capital should be given to each as property, but should rather be given as a loan ; the community as a whole should, as the one great capitalist of the social organism, meet all just or necessary claims with the aid of its inexhaustible, because constantly renewed, resources. In this way we should realise the fine ideal that is given us in the distribution of blood in the animal organism ; the community, with its inexhaustible resources, extending its beneficent influence to every—even the most distant—part of the social organism. Schäffle, the famous political economist, has the same thought in his *Quintessence of Socialism*, where he advocates the substitution of collective for private capital. There must be a continual reversion, arranged on definite principles, of private property into the possession of the community, and thence a redistribution to the periphery, or in favour of the individual. The great State-treasury should be in a sense the heart of the organism—on the one hand forcing its fertilising and nourishing contents through countless channels into the organs and tissues of the social body, on the other hand reabsorbing it by as many more channels and veins. Without the detested

Communitistic "sharing," there would be a sort of sharing taking place at every instance, and a condition of things would be set up in which would be realised the fine, oft-quoted phrase, "One for all and all for one."

It might be supposed that the idea of abolishing private property was at the base of this programme. That is by no means the case. On the contrary, private property, or all that the individual has won for himself by his zeal and industry, would remain in his undisturbed possession to the moment of his death, and would be interfered with as little as possible by taxes and other contributions to the State. Only when the individual comes to the stage when he can no longer make use of what he has acquired would he be expected to return to the community the surplus of what he has gained *in and through* it. The collective resource raised in this way forms (to use Nordau's expression) the immense reservoir which assists the need of one from the surplus of others, and incessantly smoothes out the inequalities of property which are ever arising; whereas the right of inheritance which has been hitherto recognised not only fixes these inequalities, but makes them more pronounced with each new generation.

The restriction of hereditary rights or hereditary capitalism, together with the restoration of the land to the community, is one of the most familiar claims of nearly all Socialist parties and writers; moreover, the simple death duties have long been regarded as the most equitable and least oppressive form of taxation. This claim is not merely one of economic propriety, but one also of social justice. No one will

question that all men, however different their characters, come into the world with equal right to existence; this right is hardly respected when one is born with a silver spoon in his mouth, another with the pangs of hunger. The one is soon worth millions in the balance, or can call his own a large portion of the land that should belong to all; the other stands helplessly between heaven and earth, and would die of hunger if he did not at once place at the service of others more favourably situated the strength that nature has given him. Heredity, or the right of the individual to dispose of what he leaves behind, is not an outcome of natural law, but an invention of later times, probably of Roman origin; in ancient Germany, for instance, it was quite unknown. Learned investigations as to the rise of the idea of property have rather shown that communal ownership was its first stage. It was Roman law, with its excessive emphasis of individualism and the rights of personal ownership, that abolished the earlier condition of things, and pushed personal rights to their extreme conclusion in the sense of personal egoism—a condition that still weighs heavily on the shoulders of society. “Every man for himself! Let those who can help themselves! Let those who cannot perish!” Such is the general cry to-day; the voices of the economically weak are drowned in the din of the onward rush, and whoever falls is trodden mercilessly under foot.

But let us return to the question of hereditary rights. Such rights cannot claim to be unrestricted and arbitrary, when it is remembered that the gain of the individual is not a purely personal matter; it is only possible in society, and with its co-operation. Nothing illustrates this better than the well-known

enormous increase in the value of land in the interior and suburbs of growing towns ; it pours millions into the coffers of the private owner without any action on his part, but only injures the community, which is the sole cause of the increase, by raising the rents of the houses.

Naturally so drastic a social measure as the restriction of hereditary rights could not be introduced abruptly and suddenly, but must make its way gradually by increasing progression. It might be left undecided at first whether we should stop at restriction, whether this restriction should gradually be increased up to a total abolition of hereditary rights.

We find the chief advantage of the whole process for the individual members of society in its equalising justice, and in the circumstance that every man would enjoy only the fruit of his own zeal, care, and energy, and not that of the industry or the good fortune of his ancestors. The property which a man has acquired by his own industry and economy would be untouched ; it is only that which one owes to the toil or luck of others that would be kept within certain limits. Even those who think the scheme impracticable cannot reproach it with injustice.

A further and not less appreciable advantage to the State and society is that in this way an insuperable limit would be put to the unnatural accumulation of large private means in a few hands, which in a sense constitute a State within the State, a power of gold in opposition to the power of the State. The enormous active and passive evils of such an accumulation are obvious, and might be illustrated by striking examples from modern life. They not only withdraw a great part of its contents from the general circulation of

material, but have a direct injurious effect on the social body, similar to the effect of obstructions or local swellings on the health of the animal body.

But the State—that is to say, the totality of its citizens—will find its chief advantage in the fact that, without being obliged to tighten the screws of taxation, it will find itself in possession of sufficient means to carry out all the measures which the general interest demands—such as the education and rearing of children where the resources of the individual family are inadequate, the abolition of all payment for instruction, provision for widows and orphans, the prevention of pauperism and blameless unemployment, the organisation of all the means of production, the control of commerce (otherwise self-supporting and as a rule without bounties), and finally the organisation of the entire system of insurance against age, sickness, accident, and death, and so on. When we remember that, according to the returns of the Prussian Minister of Finance, twelve hundred million marks [£60,000,000] are inherited every year in Prussia alone—and the calculation is probably much below the mark, and should perhaps be more than doubled—we can imagine how large would be the yield of a proportionate death duty, together with the State's revenue from ground-rents.

There are, of course, many objections to this kind of taxation and its practicability, the chief of which are, the fear of interfering with the instinct of acquisition, the danger of encouraging prodigality, the defeat of the law by gifts during life, and the fear of weakening the principle of the family. A full reply to these objections, which are not difficult to meet, would take me beyond the limits of this essay.

I will only remark that the effect of the right of heredity as a stimulus to work is, in comparison with the right of private property, a somewhat subordinate one. Although we hear people say day after day that they are only working for their children, we should be poorly acquainted with the human heart if we took this literally in every case. Most people save up for their own sake and for the pleasure of ownership, as is clear from the fact that we find the greatest misers amongst those who have no heirs in a direct line. It would indeed be much more natural for those who have acquired their wealth or comfort by their own exertions to expect or desire the same efforts on the part of their offspring, instead of spending all their strength in preparing a couch for them to loll on. We might take a lesson from the animals in this; they show a most scrupulous care for the feeding and rearing of their young, but leave them to themselves from the moment they are capable of maintaining themselves by their own exertions.

The thirst for money and ownership has this unfortunate quality, that it is not quenched, but increased, by attainment. It easily leads to avarice, hard-heartedness, and selfishness; only in exceptional cases does it prove the opportunity of doing good to others or serving the interest of the general community.

All this would be most beneficially counteracted by a carefully-applied law of death-duties, and the wealth of the nation would be unceasingly returned from the possession of individuals to its proper source—that is, to the bosom of the nation, which will provide for the young wherever such provision is required. Such a law would set a limit to excessive

parsimony, covetousness, and avarice, and to useless storing up and undue accumulation of dead wealth—wealth that has been withdrawn from circulation—in the hands of individuals, without adversely affecting the individual's stimulus to acquire, which depends on love of work, pleasure in personal possession, and the first provision for offspring. "Because," as Professor Hallier pertinently remarks, "there is hardly anything more dishonourable than to regard work as a burden, and fail to appreciate it for its own sake. For the man who is sound in body and mind work is the greatest luxury in life. And shall the rich be so lacking in honour as to sit in the chair of idleness, because he knows that if he acquires more it will not go to the ruin of his children, but to the good of the State and of his fellow citizens? If a man has inherited wealth, he is doubly and triply bound to prove himself worthy of his fortune by work."

In truth the consciousness that he is working, not merely for himself and his family, but likewise for the good of the community, the fortune of his fellows, and the end of the State, should prove a higher and nobler stimulus to the individual than the mere satisfaction of selfish instincts. A condition which has unhappily not yet been realised, in which the happiness of the individual is so bound up with the happiness of the community that they mutually determine each other, and that what the individual seems to lose on the one hand he receives back with interest on the other—that is the ideal of a future constitution of the State and society, which, if it were realised, would put an end to all the dreams of a Utopian Socialism.

NEO-LAMARCKISM.

It is a familiar fate of great men that, being beyond their time and its intelligence, they are not understood by their contemporaries, and sink into the grave without witnessing the triumph of their ideas. It is reserved for later generations to grant them the honour which was denied them during life. One of the most conspicuous examples of this is the fate of the famous predecessor of Darwin, Lamarck, who put forward and defended in his *Philosophie Zoologique* (1809), at the very beginning of the century, and therefore long before Darwin, the main outlines of the now accepted theory of the evolution of the organic world in opposition to the then dominant dogma of the immutability of species. Up to that time only a few isolated thinkers had expressed the opinion that the actual forms of life might have descended by gradual transformation from earlier types. But they could make no greater headway against the prevailing prejudice than Lamarck himself, who saw a few weak spots in his reasoning seized upon for the purpose of holding up his whole theory to the ridicule of his contemporaries. The philosophic view of nature which Lamarck had introduced had to give way to the purely empirical attitude taken up especially by Cuvier. It was not until forty years after the famous struggle on February 22nd, 1830, in the Parisian

Academy, between Cuvier and his colleague, Geoffroy St. Hilaire, which ended in favour of the former, and which so much interested Goethe, that Darwin's famous work on *The Origin of Species* brought the question once more before the tribunal of the scientific world, and secured a decision against Cuvier.

Poor Lamarck did not live to see this triumph of his ideas. He died in poverty and oblivion on December 18th, 1829, at the age of eighty-five, after spending the last seventeen years of his life in blindness, caused by small-pox. But Darwin's brilliant success would scarcely have proved a source of great pleasure or satisfaction to him, because Darwin followed an entirely different way from his forerunner in his attempts to explain the causes of the transformation of species; instead of the independence of the individual, which Lamarck advocated, he laid more stress on its passive behaviour in face of the transforming influences; though he generally agreed with him as to heredity, adaptation, deviation from specific type, the catastrophic theory, and other matters. On the other hand, he made a great and important stride beyond Lamarck with his famous theory of natural selection in the struggle for existence.

However, even Darwin's teaching, so much admired and appraised at first, has fallen into some disfavour, and become a subject of criticism. In particular it has been thought possible to call into question the universality of natural selection, and its determining influence on the formation of new species, without daring to extend this doubt to the theory of evolution itself, supported as it is by philosophic arguments. The theory itself seems to be firmly established in the

judgment of all competent thinkers ; but there is a great divergence of opinion as to the inner working and determining influences of development.

In such a state of things it was only natural that the half-forgotten Lamarck should be recalled to mind, and it should be asked if his theory had not been more correct than Darwin's on a number of points. In point of fact quite a school of Neo-Lamarckism has been founded as a result of this inquiry ; in America especially it has found a large number of supporters amongst the scientists of that country, who have an abundance of palæontological material at their disposal. One of the most distinguished of these is the Professor of Zoology and Comparative Anatomy at the University of Pennsylvania, Mr. E. D. Cope, who has given the fullest credit to the great French naturalist in his able work on *The Causes of Organic Development* (1896). Lamarck was the first to prove, as Cope justly says, that " nature, in bringing forth all kinds of animals, beginning with the lowest and ending with the highest, has improved their organisation gradually, and that these animals, in spreading over every part of the habitable earth, were subject to the influence of their environment, and were modified in form and habits by this influence." Lamarck assigns as the chief causes of this transformation the use and disuse of particular parts or organs in the course of long periods of time, and the transmission by heredity of the changes thus effected. A striking example of the effect of the use and disuse of organs is found in the case of blind subterranean animals, whose organ of sight has degenerated and become useless through perpetually living in darkness. The proof of the explanation is

that the eyes of the young of these animals are much larger in proportion to the body than in the case of adults, which often lose all trace of the organ with the advance of age ; and that their embryos have, to an extent, normally-developed eyes.

Moreover, as Professor A. S. Packard, of the Brown University, has shown in an excellent article on Neo-Lamarckism, Lamarck also took into account the influence of Darwin's natural selection. His views and illustrations have unfortunately often been caricatured or misunderstood. When, for instance, he alleges that birds which were compelled to seek their food in the water gradually adapted their characters to this need, he does not mean that an isolated bird gradually acquired web-feet, or long legs, or a long neck ; but that this result was attained in the course of a long series of generations by selection of the adapted individuals. Or, when Lamarck is credited with the assertion that the giraffe has acquired its long neck by continually stretching after the foliage of high trees, that is not quite correct. Lamarck merely says that the giraffe lives in arid, grass-less wastes, and so is compelled to stretch out its neck constantly after the foliage of high trees ; and that, when this habit continues for a long series of generations, the fore limbs become longer than the hind, and the neck is lengthened. Darwin explains this, as is well known, by saying that certain individuals which happened to have longer necks survived their fellows in a time of scarcity or famine, and transmitted this feature to their offspring. But this natural selection in the struggle for existence is not a *vera causa* or an active factor. It is only an expression for the outcome of a series of factors, which Lamarck had already

indicated, though he had not the powerful assistance of modern morphology, embryology, physiology, and palæontology, and the facts of geographical distribution. These factors are: changes in the environment, such as habitation, climate, ground, food, temperature, light, etc., and adaptation to them in the course of long periods of time; needs (which are much misunderstood in the Lamarckian meaning); the use or disuse of organs; the struggle for maintenance (not so clearly indicated as by Darwin); the inheritance of variations which have arisen (emphasized just as strongly as by Darwin); the fixing of these variations by the crossing of similar individuals; geographical change—all this in connection with the assumption of the spontaneous generation, probably still taking place, of the lowest forms of life in early ages, and the existence of a law of progressive development notwithstanding some or many individual cases of degeneration. Lamarck rejected the theory of great geological catastrophes or revolutions which prevailed until the time of Lyell, attacked the notion of a special “vital force,” explained instinct as an outcome of inherited habit, and indicated the cellular tissue as the parent of everything organic and the nervous system as the source of all the acts of the intelligence. Finally, he contended that the will was never really free.

It is obvious that Lamarck was leagues in advance of the natural-philosophic ideas of his time; if Darwin, otherwise so accurate, does not do full justice to his great predecessor, that is probably because, as Packard says, he had not made a sufficiently thorough study of his works. Packard calls Lamarck a true prophet of the future, who lived fifty years before his time. It is his distinguished work in

systematic zoology which brought him recognition and the name of the Linné of France. If we attribute to what Lamarck has left us the colossal enlargement of our knowledge and expansion of our ideas since that time, we enter the field of opinion which Neo-Lamarckism represents. According to its partisans, it rests on a much wider basis than Darwinism, which would have no ground for the play of natural selection and the struggle for life without the factors introduced by Lamarck. "It is clear," says Packard, "that these Lamarckian factors taken together form the foundation on which natural selection rests; without their action the worlds of plants and animals which form the field for the working of the Darwinian principles would be non-existent." Natural selection cannot be the cause, but only the effect, of the modifications or alternatives between which it chooses. The Darwinians imagine that a useful variation has been maintained or eliminated here and there, and that it is fostered and emphasized until it constitutes a new species. But the opponent of natural selection demands that useful variations, in order to be lasting, must appear in an enormous number of individuals, which shall all show a slight improvement in the same direction. That is precisely what Lamarck makes clear. The variations must be common to the mass in this way, according to him, and they must be induced by a modification of the physical or biological influences, which compelled all—or at least a great number of—the individuals of a species to acquire new habits, and thus favoured the conversion of one species into another. It is a great weakness and illogicality of Darwinism that individual or chance variation, which tends to disturb the whole process of

nature by the crossing or death of useless individuals, should be the forerunner of new species. That may happen at times ; but in such cases it is the exception that proves the rule. In popular circles Darwinism is usually taken as synonymous with the theory of evolution. That is a great mistake. Darwin only revealed one side of the great process, whilst Lamarck reached the solid foundations on which natural selection rests.

Although there seems to be no fundamental opposition between Darwinism and Neo-Lamarckism, and the one may rather be considered as the complement of the other, yet we may expect resistance on the part of many followers of Darwin—in spite of the fact that Darwin himself has in the meantime explained that he made too little account at first of the influence of the external conditions of life on the transformation of living things, so strongly insisted on by Lamarck. “The greatest mistake I made,” he wrote on the 13th of October, 1876, to Professor Moritz Wagner, of Munich, the father of the migration theory, “was, I now think, that I did not attach sufficient weight to the direct influence of food, climate, etc., quite independently of natural selection. When I wrote my book—and for some years later—I could not find a good proof of the direct action of the environment on the species. Such proofs are now plentiful.” Moreover, investigations into heteromorphism have shown in the meantime that it is possible by careful experiment to make certain lower animals grow, in the place of an organ they have lost, one of a different structure and function. What art does in these cases may have been done more easily by nature in geological time.

The great interest that educated people take in Darwin's system and everything connected with it justifies an attempt to draw attention to this most recent phase of the theory of organic evolution. The result to be expected from such considerations is probably correctly indicated by Professor Eimer, of Tübingen, when he says: "In my opinion the physical and chemical changes which organisms undergo in the course of life owing to the presence or absence of light, and through the action of air, heat, cold, dryness or moisture, food, etc., and which they transmit to their offspring, are the original elements for the rise of the manifold changes of the organic world and the formation of new species. From the material thus supplied the struggle for life then makes its selection. But the changes present themselves, in whatever manner, simply as the outcome of the principle of growth."

IDEALISM AND POSITIVISM.

WE may unhesitatingly point to the Greek philosopher, Plato, as the man who was the first to introduce into philosophy, in opposition to the Greek materialists and cosmo-physicists, an exaggerated and still accepted idealism. It was through his speculations that ideas came to have the character of something perfect and typical, which has since clung to the word "ideal." Plato was led to his appreciation of ideas by Socrates, who held that only conceptual knowledge is true. Plato affirms, on the strength of this inaccurate principle, that only the nature of things which is given in the concept is their true essence, or the real in general; or that ideas are the prototypes of existing things, on which all reality is modelled.

It is obvious that this is a profound error. The Platonic ideas, like everything metaphysical, are phantasmata without objects, which reveal so well the love of unscientific fictions. The tone of mysticism which Plato has imparted to his theory of ideas harmonises, not only with the dogmas of Christianity, but also with the mysteries of the school-philosophy down to Hegel and his colleagues.

Aristotle himself censured Plato's doctrine of ideas with critical insight. He showed the absurdity of saying that the foundations of things, the ideas, could

be separated from the things themselves ; substance disappears if it is not to belong to the object of which it is the fundamental condition. Nevertheless the idea remained a very elastic word in his system, susceptible of all kinds of extension and meaning, and proved a useful support for subsequent religious and philosophical errors.

The professional metaphysicians of the Middle Ages did not go beyond the idea-theory of Plato and Aristotle. In England alone it met with opposition, from such men as Hobbes, Locke, Hume, etc. Hume in particular gave convincing proof of the untenability of the soul-idea, and explained ideas, in complete opposition to Plato, as simply enfeebled images of sense-impressions. With critical keenness he also rejected the so often combatted and always reaffirmed possibility of metaphysics, the cognoscibility of the deity, the freedom of the will, and immortality.

On the other hand, the French philosopher, Descartes, an able though narrow thinker, broadened out the idea into the ideal to such an extent that he discovered in it the features of perfection, infinity, and eternity, and thus arrived at his famous ontological proof of the existence of God.

Ideas received a new meaning from the German philosopher, Kant. He also broadened the notion of idea into ideal, and so laid the foundation of the whole period of philosophic idealism that followed him. The weak points of his ideas were ably revealed by Kant himself ; they do not discharge the functions of empirical knowledge, yet they are a necessity in the organisation of the human mind (the gradual rise of which, by way of evolution, was unknown to Kant). But he forgot that what is known from theoretical

grounds to be untenable and impossible can never be proved to be indispensable for practical reasons.

Since the time of Kant German philosophy has brought to light many kinds of idealism—subjective, transcendental, absolute, logical, psychic, religious, moral, and æsthetic.

In the *subjective* idealism of Fichte the idea, or that which is merely thought, plays the chief part. But the idea of a world-dominating Ego is absurd, and the idealism that is grounded on it must be rejected as untenable.

Transcendental idealism is embodied in the “world-soul” of Schelling, to which also we must ascribe *psychic* and *absolute* idealism. His argumentation is merely a play with figments of the imagination, unscientific incidentals, and high-sounding words, which contain no nucleus of thought. The manifold idealisms of Schelling are at the opposite pole to positive ideals; though many important thoughts are enunciated in establishing them.

There is no more substance in Hegel’s *logical* idealism, which would demonstrate that the world is a development of the absolute mind, or that logic and metaphysics merge into each other. The “absolute mind” is the academic deity of the Hegelian school, and he is just as patient and long-suffering as every other deity in every kind of arrangement. In him, as he has to produce the whole of the real world out of himself, an ancient and naïve form of anthropomorphism is revived; whereas the continually advancing science of the modern world can find no oases in this desert of words. “It is clear,” says Svoboda, in his excellent and most commendable work on *The Illusion of the Soul*, which we have

followed in substance in these considerations, "that religious and philosophic mysticism flourish very well together in the soil of illusions."

Religious idealism, which has been much cultivated by systematic philosophy since Kant, and on the ground of which theology and metaphysics stretch out a brotherly hand, is an absolute license of unbridled imagination. Scientifically, it is no more worthy of consideration than the "phrase-idealism" of those philosophers of history "who play the part of honourable supporters of public interests, but are really only masked apologists for superstition."

As regards *moral* idealism, it is a truly philosophic deepening of moral principles, or the ideas of Kant. Its claim that whoever strives after morality must rid himself first of all of religious and ecclesiastical influences, because religion seeks to support morality by bribes and promises, agrees entirely with the claims of modern Rationalism.

Finally, as to *æsthetic* idealism, the school-philosophy has done very little in the way of explaining the beautiful, because its dualistic notions entered into the solution of æsthetic questions to their confusion. "The beautiful has nothing to do with the 'Infinite'; mind is not the opposite pole of nature; the sense-impressions correspond to reality, and the æsthetic gains nothing from concepts."

If we now turn our attention to the ideal itself, we must distinguish between *positive* and *illusory* ideals. Whilst the former keep in view the good of man and humanity, the latter are sustained on conceptual constructions or fictions of the imagination, which have no relation to reality. These illusory ideals, which unfortunately command a number of reckless and

irresponsible admirers, prevent the complete acceptance of the positive ideals of knowledge, morality, and social welfare, and cause a delay in the recognition of the truth. The antagonists of positive ideals are fully conscious that their personal interest is closely connected with the maintenance of the false ideals, and so lend the latter their most zealous support.

In face of the tenacity of the illusory ideals we can find little consolation in the circumstance that they are at times irradiated by the splendour of the high and the noble, as in the case of the divinity of the mind, the immortality of the soul, etc.; or that art has so often relieved them of their worst features. On the other hand, art always creates something positive, even when its creation is inspired by an illusory ideal. It is true that it has helped to maintain illusory ideals by many of its splendid creations, yet it has been unable to prevent their internal decay. Even its finest creations could not sustain the authority of its most popular gods if belief in them were dissipated.

There are pessimists who say that reverence for positive ideals will always be restricted to a few isolated thinkers. But they do not reflect that in the course of time even the false ideal must perish, and they do not mark the dawn of the day of positive ideals. Their authority will be accepted with a rapidity and willingness in proportion to the speed and the extent to which the results of scientific research are spread in all sections of the community. And it is practical interests and real wants which will be met and furthered by them. Ethical, political, and economic ideals of art and science are only waiting

to be animated ; the task of future civilisation will be to introduce them into real life. “ If illusory ideals have succeeded in maintaining whole races in subjection, and to influence their every thought and action for thousands of years, the power of nobler and more humane ideals will strike a firmer and a deeper root ; for it is one with the happiness of humanity.”

HUMAN PYGMIES OF THE STONE AGE.

THE widespread stories of human giants and dwarfs in earlier ages have proved, with regard to the former, to be illusions. What were once considered to be the osseous remains of a former race of human giants have proved on more careful examination to be the osseous remains of former animals (the mammoth, hippopotamus, etc.). The Greek myth of the giants that once stormed the heavens, which was inspired from, or at least supported by, such sources, is thus recognised in its true character as a fable.

Scientists were of the same opinion for a long time with regard to human dwarfs. It was known that a certain number of dwarfish men, or men arrested in their normal development, had been found in different places; but, so long as no real races of dwarfs had been discovered, these were justly regarded as the outcome of a degeneration from the normal human type. The matter is now in a very different light, since such races were discovered, not long ago, in the dense forests of Central Africa. The names of many African travellers and explorers, such as Krapt, Hartmann, Schweinfurth, Wolff, Du Chaillu, Emin Bey, Stanley, Stuhlmann, Junker, etc., are associated with this most interesting discovery, and it has led the majority of these explorers to believe, with the highest probability, that the whole of Africa, from the southern

limit of the Sahara to the Cape of Good Hope, was originally inhabited by these savage, nomadic, dwarfish, hunting races, which have different names in different localities (Akkas, Batuas, Dokos, Obongos, etc.).

In the meantime, however, the presence has been proved in Asia, America, the Archipelago, and even Europe (for instance, in Sicily, Russia, and other places), of remains of this earlier dwarf population, or of dwarf races, which, as in Africa, have persisted down to the present day by the side of the taller races, and which are comprised under the general title of the human pygmies or *nannocephali* (little-headed). The Japanese may be considered as a special variety of the pygmy type; it is mostly composed of comparatively small individuals, though they are by no means so small as the real pygmies (4-4½ feet). On the average the pygmies are about a foot below the height of normal men. They are also distinguished for their slender, delicately-formed bones. That they are not an abnormality from the human type, but a race, or an anatomic variety with distinctive features, is, as I shall show, beyond question.

In these circumstances a discovery of the presence of such races in the earliest times seems naturally to be a matter of the highest scientific interest; the more so as we rarely discover remains of pre-historic men. A human colony of that early period, extending back for many thousand years, was discovered by chance and scientifically investigated between 1892 and 1896 at Schweitzer's-bild, near Schaffhausen, in Switzerland. It belongs to what is called the post-glacial period—that is to say, to the time which followed the last advance of the Rhine-glacier upon the foreground of

the Alps. Moreover, a long period must have elapsed after the retreat of the ice in which even a thin layer of soil could be formed by weathering in the valley and on the hills for plants of the lowest growth, and a corresponding animal population could support itself on the sparse vegetation. Not until then could men who lived by their hunting settle in the place, which was protected against climatic influences by a huge rock that towered up from the plain and over-arched a little at its foot. It is not far from another famous spot where pre-historic remains were discovered—the Kessler-loch at Thayningen, near Schaffhausen.

The name Schweitzer's-bild [literally Schweitzer's-image] was given to the place because a man named Schweitzer had erected an image on his house there. That primitive man should seek shelter there from climatic inconveniences is easily explained from the fact that the climate of that period was raw and cold, like that of North Siberia; we could expect nothing else at the close of the ice-age, and it has been proved by remains we have discovered of an *arctic* fauna or animal population. Fortunately the geologic-palæontological conditions at Schweitzer's-bild are so clear and plain that they could almost be named in theoretic order. At the bottom, on the rubble, lies the layer, about 28 inches thick, which represents the life of palæolithic man; we conclude from the indications of fires that he already knew the use of that element, but that he only occupied the locality from time to time.

From that time there set in a gradual change (in an upward direction) of the climate, which brought about the rise of a sub-arctic steppe-fauna with a corresponding flora, though the usual steppe-fauna is only found in the subsequent "yellow human

layer." Of the products of human art there were found great quantities of palæolithic or crude flint implements, shaped by pressure or striking, for which the flints of the neighbouring Jura Mountains had furnished the material; later there are plenty of implements of horn or bone. All the larger bones of animals were undoubtedly split for the purpose of extracting the greatly-prized marrow. Much the most numerous among these remains are the bones of the reindeer; then there are remains of the bear, wolf, fox, stag, roe, bison, boar, wild-horse, marmot, and so forth, together with those of all kinds of birds and rodents. The real arctic or winter fauna had already disappeared at the time of the "steppe-fauna," so that we may infer the prevalence at that time of a rather warmer climate, similar to that of South-western Siberia. At the same time the traces of human action multiply to the extent of about 14,000 flint implements and 1,300 articles made from bone or horn (generally of the reindeer). Stones for beating and hurling, anvils, and stone-hammers were found together with fireplaces constructed with plates of stone, slate, etc., with burnt bones and great heaps of ashes and cinders. There were also numbers of ornaments of shells or teeth, shells full of colouring matter (for painting the body), musical instruments, generally made from the bones of birds, crude sketches on plates of stone, and carvings. On the other hand, not a single *polished* stone implement was found in these layers and not a trace of pottery, so that the whole period we have covered must be assigned to the age of palæolithic man (the oldest stone-age). Moreover, the dwelling of men in the place continually increased with the advance of the warmer climate.

There must have been a cessation of habitability during the time of the next section, called the *Breccia-layer*, and consisting of yellow fragments of lime-stone, the duration of which is estimated by the discoverers (from its thickness of 32–48 inches) at from 8,000 to 12,000 years. The underlying strata must also represent a duration of some 8,000 years, and the chronological age of the whole deposit, of a thickness of 96–116 inches, is estimated at from 24,000 to 29,000 years.

In any case during the time of the *Breccia-layer*, which represents the intermediate period between the older and the younger stone-age, there was a slow but decided improvement of the climate with a corresponding complete change of fauna and flora. It was the time of transition from the steppe to the wood, and consequently to the appearance of great numbers of forest animals. The remains of human activity are comparatively so few in this period that we can only infer a very transitory occupation of the spot by men during this intermediate age.

There is another complete change during the deposit of the next, or fourth, *grey* or *neolithic* or human layer proper, the formation of which, being about 12 inches in thickness, must have taken a period of 4,000 years. It comes under the general heading of the later stone-age, characterised by polished stone implements. It is true that only a portion of the implements are polished, whilst by far the greater part of them belong to the type of instrument of the palæolithic age. On the other hand, there were found a number of fireplaces, and rough, unglazed pottery, made by hand without the aid of the lathe. The very plentiful fauna of the grey

deposit, amongst which we fail to discover any trace of the dog, closely resembles, according to Studer's researches, that of the oldest lake-dwellings of the stone-age; we may infer from that, as well as from the small numbers of polished implements, a comparatively great age of the neolithic deposit of Schweitzer's-bild. It is probably a connecting link between the purely palæolithic period and the oldest period of the lake-dwellings. The articles made from bone or horn, rare but well fashioned, are almost exclusively made from the bones and antlers of the stag, as distinct from the earlier ones of the age and the bones of the reindeer.

On top, and immediately over the neolithic layer, lies a stratum of soil belonging to the present time, of about 16 inches in depth, which requires about 4,000 years to admit its formation. This layer contains all kinds of remains of ancient, later, and the most recent times, belonging in part to the age of metal. Wandering hordes lit their fires here and cooked their game even in historic time. Only a few years ago the rocks were a favourite resort of wanderers, especially gypsies and hunters, who were protected by them. To-day the rock is still a favourite play-ground for the growing youth of Schaffhausen.

The chief interest of this deposit at Schweitzer's-bild, which illustrates so clearly the chronological succession of the various stages in the existence of pre-historic man, lies naturally in the discovery of human remains. These remains have been discovered in the neolithic as well as in the yellow human layer. Nevertheless, it may confidently be stated that the latter do not belong to this layer, but are found in it because the inhabitants of Schweitzer's-bild in the

neolithic period buried their dead in the layers underneath. There were found in all the skeletons of *nine* persons of normal growth and *five* pygmies, by the discovery of which Europe entered into line with the other continents which have pygmies. Professor J. Kollmann, of Basle, one of the most distinguished anatomists of the day, has made a thorough study of these pygmy-remains, and has published the result of his inquiry in an admirable work, which forms part of the great and exhaustive description of the Schweitzer's-bild deposit in all its different aspects by a group of eleven scientists (Studer, Nehring, Kollmann, Penck, Gutzwiller, Früh, Meister, Hedinger, Nüesch, Schöten sack, and Bächtoldt), published in 1896 by the General Swiss Association of Science with a subsidy from the Government. He first notes the extremely favourable conditions for the preservation of the remains at this spot, which, however, do not belong to the palæolithic, but to the earliest section of the neolithic age. Amongst them were found, besides men of a normal height of about $5\frac{1}{2}$ feet, four or five pygmies, the average height of whom fell about a foot below that standard. The skulls also were comparatively small, being on an average about 7–10 ounces below the cubic capacity of the normal skull; but they were, just as happens in the taller races, partly mesocephalic, partly dolichocephalic; so that even at that time there must have been both long and broad faces. But it is impossible to deduce a feeble capacity from the smallness of the skull, as it is otherwise quite in proportion to the rest of the well-built skeleton. They showed no morbid features whatever, so that sound pygmies must be regarded, not as abnormal dwarfs, but as an anatomic variety

of the human race with distinct characteristics. They are probably, Kollmann thinks, the remains of a race of human dwarfs which inhabited Europe before the arrival of the taller races, and represent an earlier stage in the history of man than the taller varieties. They may also be considered as the intermediate links between the primitive human form and the actual races of men. Kollmann sums up his opinion on the pygmies in these words:—

“If the dwarf races are the forerunners of the taller races, as we must admit to be very probable, they form an intermediate link of humanity, which fills up in part at least the gulf between us and our more remote ancestors; and the ancestral tree of European men admits a fuller construction than was ever thought of before.”

In any case, the remarkable discovery at the Schweitzer's-bild, together with the conclusions of modern anthropology, gives us a glance into the depths of the past of our race, of the existence of which there had hitherto been no suspicion. In all probability the discovery will not stand alone, but will be completed by later finds. The credit of the first discovery and subsequent most industrious investigation goes undoubtedly to Dr. Jacob Nüesch of Schaffhausen, who edited the above-mentioned collective work, and has published separately, with the title “The pre-historic colony at Schweitzer's-bild near Schaffhausen: The deposits and their lessons,” his own contribution to it. It affords those who are not in a position to consult the large work sufficient information as to the substance of the interesting discovery. The several results of that discovery are summed up as follows by Dr. Nüesch in the preface which he added to the collective work:—

1. The establishment of the succession of a tundra, steppe, and wood fauna in one spot in a more perfect condition than has been found in any other part of the Pleistocene period.

2. The proof that all these faunæ were post-glacial, and therefore evidence of post-glacial climatic variations.

3. Proof of the contemporary existence of palæolithic man with the earlier two of these post-glacial faunæ.

4. First discovery on land of an important cemetery of the neolithic period, and of a fossil human race of short stature, the pygmies, which was hitherto unknown in Europe in connection with this period.

5. The knowledge of a clear succession of the various strata, which made it possible to form an approximate estimate of the absolute age of the whole deposit and its various layers.

6. Proof of the various successive human epochs from the earliest stone-age to the present time.

It goes without saying that these results were only attained by using the utmost care and consideration in the excavations, and with the help of a vast store of knowledge and enormous expense. They and the credit due to the scientists engaged have been fitly recognised in learned and professional circles in every country. "As long as anthropology and the pre-historic history of man engage attention," wrote Dr. Hoernes, of Vienna, author of *The Early History of Man*, to Dr. Nüesch, "your book will remain a mine of information." Professor J. Ranke calls it the fine achievement of a Swiss scientist. Professor Géckie says of the work: "It is by far the most important contribution to the history of the Quaternary epoch

that has appeared for many years.” Professor Bulliéty, of Geneva, writes to the author: “I do not know which to admire most, the fortune that has favoured your investigations, or the energy with which you have pursued them.”

A first selection from the more than 20,000 objects discovered has been sent to the Swiss National Museum at Zürich, and is now one of its most notable exhibits.

ANIMISM, SPIRITISM, AND OCCULTISM ;

OR, ANCIENT AND MODERN GHOSTS.

WHATEVER is mysterious, inexplicable, and apparently miraculous has always had a remarkable fascination for the human mind and been a prolific source of all kinds of notions which have proved in the course of time to be errors and mere products of the imagination. Moreover, the errors or fancies have not disappeared with the disillusion, but have merely assumed other forms and shapes. There are spirits and ghosts to-day just as there were thousands of years ago ; only the former malice of their disposition has been modified with the advance of civilisation. They no longer contemplate injuring man with the aid of their supernatural powers ; they are content with the modest *rôle* which modern spiritism assigns them.

It is true that we have thus lost the graceful poetry of what is called *animism*, or the earliest stage of religion, in which primitive man considered the whole of nature about him to be just as alive and animated as he was himself. In every animal, every plant—nay, in every stone—he recognised himself in a certain manner, or his own being, and he was utterly devoid of the religious doubts or scruples which tortured later humanity. This stage of man's development may also be regarded as a state of

absolute irreligion ; there was no craving whatever for religious ideas properly so-called, and man felt himself to be in perfect harmony and unity of being with surrounding nature. There were in that early age no gods, no temple, no priests, no odour of victims ; nothing, in short, that bore the character of religion or pious usage—a condition of which later traces are found in such forms of religion as *fetichism*, etc.

This almost idyllic condition could not last long, as violent and inexplicable natural phenomena must soon have made man feel the opposition between himself and nature ; and very little reflection was needed to find the antithesis of “natural” and “supernatural,” which is more or less at the root of every religion, too narrow, and draw the inevitable conclusions. Still, the notion of causality, or the feeling of causal connection, is not an innate possession of the human mind, as many philosophers affirm, but something acquired by way of experience. Very indefinite in the animal world, it reaches a higher level in man, and only makes its way gradually into consciousness after long experience and exercise. Indeed, the full and clear consciousness of the general law of causality is only found in perfection in very few and highly educated men. Hence it should not surprise one that the “natural” and “supernatural” seem the same thing to the mind of the savage, who has as little notion of causality as children and uneducated people generally ; and that he makes no distinction between his own personality and the surrounding world.

We may regard as the first step in the direction of deliverance from this mental confusion with nature

the belief of primitive man, corresponding to animism, in the migrations of the spirits or souls of the dead. The slightest reflection on the connections of things must have suggested to primitive man the question as to the causes of the phenomena of sleep and dreams, fainting, unconsciousness, trance, visions, hallucinations, and especially death, which were unintelligible to him. The latter, which remains to the present day the greatest problem in the world, and is rightly assigned by great philosophers as the true source of all philosophy, could not possibly be understood in an animistic sense as a natural event by primitive man, but was bound to be conceived as due to special causes, inimical influences, and so forth. Hence the natural belief that man was made up of two entirely different natures, a *bodily* and a *spiritual* one, the latter of which withdrew, in the above circumstances, from the body belonging to it for a time or for ever, to wander about the world, and after death to exercise a usually injurious or undesirable influence on the living survivors. These souls or spirits were conceived as wholly material beings, in a manner as shadows or living images of the body, having a certain weight and therefore leaving traces of their passage in the sand, or flying through the air, haunting the places where they had dwelt and graves, especially their own graves, feeling hunger and thirst and the desire for sensuous enjoyments, able to speak and to exert a greater strength than when they were united to the body. Amongst many nations we find a belief that the souls fly to a more or less remote region of the dead, which is sometimes situated in the depths of forests, sometimes on high mountains, sometimes in distant islands, sometimes

in the heights of heaven or the bowels of the earth. This soul-theory, which has only a very remote affinity with the Christian belief in a personal existence after death, is also the reason why many nations make holes in the coffin, or the dead-house, or the roof of the house in which the corpse lies, in order to let in and out the departing or returning soul. Very probably we can explain in this way the round holes which have often been found in one or other of the stone-plates which enclose the dolmens or graves of ancient times. Even the extensive practice of sacrificing men and animals at the death of kings or princes, and the horrible practice of burning widows, seem to be explained by the belief that the souls of those who are killed must continue to serve the soul of the dead beyond the grave. The well-known head-hunts of the Dyaks of the Malay Archipelago are also explained by the belief that the souls of the victims must serve the murderer in the next life.

In China and Japan the same belief or theory in a more emphatic shape has given rise to a certain form of religious cult, the familiar ancestor-worship (also practised by other half-civilised nations), which there takes the place of the worship of God.

This belief or idea casts its shadow far back into historic time and classical antiquity, as we have eloquent proof in the well-known world of shades of the Greeks. "We read in the *Iliad*," says Tylor, "how the dead Patroclus comes to the sleeping Achilles, who tries in vain to grasp the soul, that vanishes like smoke; or how the seer Hermontinus used to leave his body, until at length he became a disembodied spirit, because his wife burned his body on the funeral pile one day during the absence of the spirit."

In the rise of this belief an important part is played by the fear of the unknown, or of mysterious and evil influences of every kind, which could not be explained in a natural manner. The soul of the savage who holds this belief is filled with a continual fear of the unfriendly attacks of spirits, which are the causes of all the maladies and evils that afflict humanity, and against which he tries to protect himself by all kinds of magical performances. Even death is not a natural event in his eyes, as I said, but is always caused by witches or magical art; and every man falls after death completely into the power of the disembodied spirits. It is especially from the souls of people who held a position of authority in life, such as chiefs, kings, priests, etc., that he expects the effects of their good or ill will, so that by degrees a formal hierarchy of souls is developed, corresponding to the social gradations of human society.

Many scientists and thinkers are definitely convinced that the belief in and worship of God, and perhaps religion itself, have been developed exclusively from this cult of souls or of ancestors. However this may be, the belief in spirits is not lost in any case, but has, as I said, continued down to the present day in a greatly modified form. We need not inquire here what affinity there is between the spirits of the past and those of the present. There is certainly a great resemblance between the two, with the difference that, in harmony with the progress of civilisation, the coarser character attributed to them in earlier times has been converted into a more spiritual or ethereal nature, so that modern spirits do not need holes to get in and out, but can pass comfortably through closed doors, or can make their appearance, in spite

of every mechanical obstruction, wherever they are requested through the spiritistic mediums. Still the American spiritists think they have discovered (how? is unknown) that spirits weigh three or four ounces. Slight as that weight is, it raises difficulties when there is question of passing through a closed door. But no such difficulties exist for the spiritist believer. The desire that lives in every man to peep behind the awful mystery of death is so strong that it beats down all doubt on the part of reason or intelligence, and has given rise to a formal science of mystery, or *occultism*, against which the advanced science of our day has struggled without success. Even the ideas of the "Anti-spiritists," who expose to the public the machinery of the spiritistic conjuring, were and are unable to instruct it sufficiently.

However, modern spirits have this advantage over their ancient colleagues, that they have laid aside all malice, and are content to do their best at all kinds of small conjuring tricks, such as any clever conjurer can perform just as well—or perhaps better. Nor can we suppose that they have found an opportunity of further cultivating their minds in the land of spirits; their messages are not very satisfactory as a rule, and do not show any trace of that higher intelligence which should inevitably be associated with the alleged condition of a better life. Perhaps we should excuse this on the ground that, according to "occult" teaching, the life after death is only a continuation of this life, and that the so-called dead are "more living than the living themselves," when they have clothed themselves with their "astral" or ethereal body. In proof of this we have the countless mysteries, apparitions, and ghost-stories, with which the writings of

the spiritists and occultists are filled, and which, they say, can effect a reconciliation of religion and science, metaphysics and natural investigation.

Such a reconciliation would indeed be admirable. But where are the theologians, philosophers, or scientists, who think it possible on the basis of spiritist and occultist assertions? True science is never "mysterious," but can be learned and understood by every man who has the necessary qualifications; whilst the mystic knowledge of spiritism is only accessible to minds which can look into what is hidden. Spiritism, with all its appendages, is one of the mental epidemics that afflict humanity from time to time, but also, like all other epidemics, disappear in the course of time. But true science will go on its way as it has hitherto done, and only halt when it is arrested by the inevitable limits of human knowledge. Then may faith take its place for those who need it—but as faith, not as science. For that cannot be science which—examined in the light—is nothing else than a revival in modern garments, or a new edition, of the first stammer of ignorance.

THOMAS HOBBS.

PHILOSOPHIC freethinkers and professed materialists have not always met with such violent enmity as they do to-day under the pressure of reactionary forces. Even the Middle Ages, otherwise so unfavourable to rationalism, offer a few examples in illustration of this thesis. One of the most striking of them is found in the life of the great English philosopher Thomas Hobbes (1588-1679), who spent the ninety-one years of his life in a way which contrasts strongly with the martyrdom of other like-minded thinkers at various periods. He was always held in the highest personal esteem by both his political and philosophical opponents. That may have been due in part to his connection with the heads of the English aristocracy (whose favour, however, he never obtained), and to his position of personal independence. "Without any particular calling, without family, of distinguished extraction, but honoured in the best circles for his knowledge and ability, often travelling abroad for long periods, meeting men of all classes, but especially—besides soldiers—physicians, jurists, statesmen, and poets, he presents the type of a modern *littérateur* in a higher sense, wielding a power by his pen which theologians alone had possessed until the sixteenth century, and in the opposite sense"—thus does F. Tönnies describe the life and position of his hero in

the work he devoted to him. A strong opponent, Lord Clarendon, calls Hobbes "a man of brilliant gifts and great intelligence, which he has cultivated by reading, but especially by his own reflections." Even Cromwell, his great political antagonist, from whose Puritans Hobbes had to take refuge in France for a long time, afterwards showed him very marked favour.

His philosophy may be characterised as a kind of embryonic analogue of the rationalistic philosophy of modern times. His chief work, the *Leviathan*, points the sharp weapons of criticism mainly against the Church and its teaching, and was therefore most strongly attacked by the contemporary supporters of the clergy. Hobbes endeavoured to prove in this comprehensive work that that teaching, and consequently all spiritual dominion in Christian ages, are based on a false reading of Scripture, demonology, and other relics of paganism, useless philosophy and legendary traditions, the suppression of reason, and so forth—all this to the material advantage of the papacy and the clergy. Nor does he hide the fact that his discourse is directed just as much against every Church that claims a peculiar right as against the Church of Rome. He very wittily compares the Christian miracles to pills, which must be swallowed whole without mastication. Of the clergy in particular he says that they have introduced and spread in the Universities an empty philosophy, partly based on Aristotelic errors and partly on popular superstition. They are always intent on the augmentation of their own power, and they, therefore, strive to extend the control of the law, which is only a rule of conduct, to the thoughts and knowledge of men, by the examination and inquisition of their opinions. They have

also made the preaching of the gospel the privilege of a certain class, though the law leaves it free to all. The power of the Church is, when divines call it a divine right, nothing else than a usurpation. Church influence must be broken by civic intervention throughout the whole of education. The suppression of rationalist ideas has only the effect of embittering and consolidating opponents. A State may enforce obedience, but not convictions.

It need not be said that the *Leriathan* brought upon its author the bitterest attacks of the whole of the English clergy. A vast number of abusive and polemical writings appeared, not only from clerics of both the theological camps, but also from academic professors of other faculties. On the other hand, these attacks caused the *Leriathan*, which had in the meantime been publicly condemned by the English Parliament at the instigation of his opponents, to be read all the more eagerly. As his enemies had succeeded in inducing the Government to withdraw permission to publish from him, the price of the work ran up eventually, in antiquarian circles, from eight to thirty shillings. A Latin translation, which was partly a modification of the work, had to be issued at Amsterdam in 1658.

In 1655 appeared the first part of his philosophic system under the title *De Corpore*, comprising logic and the elements of philosophy and natural philosophy, in the course of which Hobbes declared war on theology. He compares it to the *empusa* of Aristotle, the spectre that had one foot of brass and the other of an ass. In the same way theology has a solid foot in Holy Scripture and a putrid one in metaphysical philosophy. There is, according to Hobbes, only one reality in the

world, though it presents itself disguised under many forms—it is movement, eternal, without beginning, the cause of each and every change. Everything in nature proceeds on mechanical principles; all phenomena may be traced to one form of matter, stimulated by many kinds and measures of movement, the sensations of living things as well as the modifications of all other bodies. He compares the State to a man, and man to an anatomic machine. “For,” he says in the *Leviathan*, “what is the heart but a spring, the nerves but so many cords, the joints but the wheels which permit the movement of the whole body?” Even rest is resistance, and therefore movement. Heat is explained by Hobbes as, not a material, but a movement; he thus enunciates one of the most important principles of modern thermo-dynamics—a principle which was not scientifically established until long after his time. He takes his stand entirely on the ground of modern empirical philosophy when he regards as vain and absurd every exercise of reason that goes beyond the data of experience, and when he sides with Gassendi in his effort to banish the metaphysical ghosts which Descartes had raised again. He also approaches modern thinkers when he expresses in strong terms his aversion from “word-philosophy,” which unhappily seems to be still far from extinct. Words, he says, “are the coinage of wise men, but for fools they are money that is valued according to the authority of ancient doctors.” Hobbes would have been just as opposed as modern thinkers to the spiritist frauds of our day if he had witnessed them. He thinks the existence of spirits or ghosts is neither rationally conceivable nor empirically proved. “The word mind means nothing but an imaginary inhabitant

of the brain " (*Leviathan*). The phenomena of spirits are real, but they are wrongly interpreted, because men do not think correctly, and do not know that such appearances are only creatures of imagination; and in this belief in spirits is based, besides many other errors and illusions, the false notion of supernatural inspirations and events. It is, moreover, the basis of the power of the priests, and the establishment of the kingdom of darkness, the threat of supernatural and eternal punishment, the tyranny over the thoughts and consciences of men; all of which is so largely developed in the Church of Rome. "The papacy is the ghost of the departed Roman Empire, sitting crowned on its grave." To banish this ghost and all the cognate lesser ghosts is the aim of true science on its practical side; it has no greater enemy than superstition in that form. Hence Hobbes is mainly preoccupied with the destruction of superstition—especially the superstition which is indigenous to all nations, and has found its way deep into all scientific interpretations of things—namely, the notion that the soul is a thing that leaves the body at death, if not during sleep, fainting, and ecstasy, and may become an aerial, shadowy being, that may be visible to dreamers and visionaries. He attacks this phantom of the soul with all the weapons of criticism as an extremely poetical or extremely horrible fiction of the imagination. He never tires of repeating—it seemed a paradox at that time, but is now a commonplace—that all such phenomena are purely subjective, differing only in degree of clearness or in strength of imagination. It makes no difference whether the phantom is regarded as something material, as by the people, or immaterial, as by the philosophers; "in

reality it is only a tumult or a diseased condition of the brain." To the same category belong dreams and dream-images which have no special significance except that they are so frequently taken to be, not dreams, but realities; just as such phantasmata or visions may occur even to the waking, if they are timid or superstitious. Hobbes was the first, according to Tönnies, energetically to defend this origin of all belief in spirits and ghosts, and to recognise in it, in part at least, the natural seed of religion. Religion in the familiar (but not true) form and superstition are one and the same thing in his esteem. Superstition means unauthorised, and religion authorised, versions of the dominion of invisible power. Fear is the last nucleus of all such theories, and fear is natural to men "in the dark"; that is to say, as long as they are not illumined by the knowledge of real causes. When they see nothing, they can have nothing to praise or blame for their good or ill fortune, except an invisible power; and they conceive this power to be like dream-apparitions, etc., and call it "spirit."

On the question of the freedom of the will Hobbes takes up the attitude of absolute determinism, and finds only emotion and passion, not reason, in the mutually-contradictory writings of moralists and politicians.

It is remarkable that a philosopher of such advanced views should, at a time that was supremely unfavourable for such views, rise to the highest honour and secure general admiration, whereas two or three hundred years later he would have fared no better than like-minded thinkers of the present day; and again that his words had so little effect in opposition to the powers that were that the present day still finds

us struggling and fighting over the very questions which he handled so ably. It is, in any case, not a good sign of the mental development of humanity, which is said to be growing deeper and more penetrative.

THE FREEDOM OF SCIENCE AND THE UNIVERSITIES.

THE draft of the Bill of the Prussian Minister of Worship, Bosse, on the regulation of the disciplinary relations of private teachers, known as the *lex Arons*, has again drawn public attention to the condition of our German Universities. It may be said of them with perfect justice that their arrangements, largely borrowed from the Middle Ages, are essentially behind the spirit of the time. They have long since more or less laid aside their former character of *universitas literarum*, or nurseries of free science and higher culture, and become training institutions for the learned professions, and especially for future instruments, as compliant as possible, in the machinery of the State. Yet Herr Bosse has bluntly declared in the Prussian Parliament that the Universities are not only homes of science, but also "schools in the service of the monarch and the Prussian State, and that it is their duty to inspire youth with love of their king and country, and respect for the monarchy and the constitution."

The "free science" of which Herr Bosse spoke with a pretence of friendliness really comes to grief by his measures; it must henceforth bend to the pressure which will be put by future administrations on the representatives of science at the Universities—a

pressure which will make it impossible for them to teach anything that is more or less opposed to the prevailing opinions or the political tendencies of the rulers of the State. New and advanced thoughts or inquiries that rise above the level of the customary will thus be repressed. Small minds and retailers of science, or characterless underworkers who seek in vain "to reconcile the ten-thousand-year old absurdity of theology with exact science, or to clothe children's fables with the garments of philosophy" (as E. Reich puts it), will occupy the sacred chairs, which should shine with the light of knowledge and the better insight of the nation. This menace, however, has little or no importance for the learned special professors at the Universities, who have little to fear from the anticipated conflict with dominant influences, and who, as a rule, think the most modest measure of mental work sufficient to make "a man of science" with honours and distinctions. But it is otherwise with the few who do not find mental satisfaction in specialist work, and venture to go beyond it, and either develop ideas which bring them into conflict with the forces and opinions ruling in State and society, or set themselves up in direct opposition to the dominant and powerful authorities of the present or the past. They are soon turned into scientific heretics, and all the means of the modern persecution of heretics are employed against them, just as those of the past were employed against real heretics. They are not, indeed, burned on a slow fire at the stake, but put to the much slower and more sensitive torture of calumny, neglect, and deprivation of the means of life; and that means so much more, since scientific heretics of this kind are usually endowed

by mother nature with a particularly keen sensibility.

One of the best-known heretic-hunts of this kind in recent years is that of Dr. Dühring, private teacher of philosophy at Berlin, who gives penetrating expression to the cry of moral pain of one who has been thus ill-treated and persecuted, in his admirable work on *The Worth of Life* (Leipsic, 1877).

I was more fortunate than Dühring as regards material circumstances, though I won less sympathy and consideration for my fate, when I was expelled from my position as private teacher at the University of Tübingen forty-two years ago on account of the publication of *Force and Matter*, as it was feared that I would poison the hearts of the young students of Württemberg with my teaching. As generally happens in such cases of persecution, the opposite effect to what was intended was really produced; I was forced to adopt a profession with which I was able to continue this supposed poisoning on a much larger scale. The phenomenal development in our time of the printing and sale of books makes it easy for the innovator to introduce and spread his ideas, even when the wood of a professional chair is refused as the necessary speaking-tube.

This leads directly to the description of a further cause of the deterioration of the Universities as institutes of general culture and centres of instruction and learning. I refer to the extraordinary extension of instruction, which withdraws, partly the means, and partly the interest for it, from the generally small University towns to the large and populous centres of commerce. Hence it happens that in many large towns much more is done for the cause of education by private action and combination than in its privileged

nurseries with all their prerogatives. Correspondingly, private teaching continues to gain in importance and influence as opposed to the official and professional representatives of science. This is still more true in England than in Germany; in England the most important results of the last few decades have been reached by private scholars. In proof of this we need only recall Darwin, who has thrown whole faculties into movement and excitement, and inspired whole libraries by his achievements, and who outweighs the whole crowd of professors, great and small, though he was not one himself. Besides Darwin we have the brilliant names of J. S. Mill, H. Spencer, E. C. Lewes, A. R. Wallace, Sir J. Lubbock, Tylor, etc. Even in Germany we have only to recall the names of Schopenhauer, Strauss, Dühring, Feuerbach, R. Mayer, and E. von Hartmann to prove that science may flourish very well outside the walls of a *universitas literarum*. But what a strange condition of things it is in which official science must partly nourish itself on the crumbs that fall from the table of free, unofficial thought, although the latter has to struggle against difficulties, which are quite unknown to what Schopenhauer called, with such bitter sarcasm, the "stall-feeding" professors.

As the third factor in the degeneration of the Universities as institutes of general instruction we may take their antiquated form or constitution, which contrasts so strongly with the spirit of our own day. This antiquated constitution stands out in modern times, with their demand for light, air, and a dignified simplicity, like a mediæval house with its fantastic spires, turrets, bows, and little, lead-framed windows; it produces bragging, idle students with

their wildness, ruined characters and healths, wasted strength, etc., and admits nepotism and favouring amongst the teachers, of which we shall have more to say presently.

The fourth of the causes which have contributed to destroy the former importance of our Universities as institutions of general learning is the phenomenal increase in the importance and extension of the book trade, which nowadays quickly and readily supplies the general public with the latest mental creations and all the necessities of mental life. To-day people can learn almost anything from books, and frequently better than from the lectures of the University professors; only practical science and skill, depending on observation, exercise, and experiments, must to some extent be excepted. Apart from these practical faculties, in which personal and oral instruction seems indispensable, what have we left? A usually lengthy and tiresome study of text-books, which is frequently only a paraphrase of a compendium made by the professor or another; to which must be added the further grievance that the professor rarely exhausts his subject, but dallies with questions which interest him, though not his hearers. As to the latter, they either pay little attention to what they hear, or assist their memory—and at the same time keep themselves awake—by taking notes. The notes, however, are generally useless, and have to be replaced by good books later on. But there is a third, and very numerous, class of students, who simply shirk the lectures, and fill up their time with drinking, duelling, smoking, walks, and so forth. When the examination day comes they have to redeem the time wasted by a rapid and unintellectual cramming. Naturally, there

is very little question of real science and instruction in such circumstances ; all they think of is the practical point of getting through the examination. This conduct of the students gives little concern, as a rule, to the professors, with a few very honourable exceptions, provided the college and examination fees are paid regularly.

Closely connected with this is a fifth reason for the deterioration of the Universities in their character of institutions of higher culture. It is the general materialistic temper of the times, which only regards as worthy of consideration those branches of knowledge that are related to the goose with the golden eggs. The really humanist studies that aim at general culture are thus thrust aside and neglected ; the desire to come as soon as possible under the safe protection of the service of the State causes all that is not related to their special aim to be more or less forgotten or ignored by the great majority of the students. In the catalogues of lectures which are published twice a year at the various Universities there is no lack of announcements of lectures on subjects of general information, such as literature, history, geography, geogeny, languages, philosophy, political economy, general science, and so forth ; but, when one makes inquiry about these things, he finds as a rule that only a pleasant deception of himself and others has been provided, and that most of these lectures are really very rarely delivered. It is only the lectures on professional subjects that are studiously followed ; and these, as a rule, only because the professor is also the examiner, and a neglect of his lectures would have evil consequences. If the duty of examining were entrusted to a commission

entirely independent of the University, without regard to where, when, and how the candidate had acquired his knowledge, the professional faculties would probably share the fate of the lecturers on *humaniora*.

The sixth, and last, evil of our present University system seems to be the nepotism and favouritism, so well delineated by Dühring, which unfortunately penetrates the whole life of the State, but finds a particularly fertile soil in institutions which, like our Universities, cut themselves off by a certain exclusiveness from the general social movement. The leading and influential professors are—apart from favour to relatives—usually surrounded by a whole troop of younger men, for whom flattery and continual extolment of the merits and opinions of the patronising master is the path to their own advancement. That this has a prejudicial influence on both sides, and that men of real merit and some sense of honour are forced to retire or are thrust aside, is obvious enough. As a consequence men of little talent, who are good at describing a certain fly, or commenting on some old work, or who have added a new dissection to the hundred ways of operating, and so on, shine as luminaries of science in the academic heavens; though their general scientific culture is often exceedingly scanty, and their lack of philosophic mind or intelligence betrays them into blunders that would hardly be excused in an undergraduate. In the meantime men of real genius, who count on merit rather than on favour, share the fate of the hare at which the simple scholar may shoot, as Schopenhauer acutely remarks, as long as he lives, but it will only be cooked and eaten after his death.

At the present time there is certainly no question

of an improvement of these matters, which Dühring criticised in his day (1877) much more fully and keenly than can be done here, at all events in the present reactionary mood of the times. Settled custom opposes too stern a resistance to every innovation. The attempt of the Berlin students, instigated by Dühring's attack, to introduce such a reform has had no lasting success, as was anticipated. At the "Meeting of all interested in the free culture of science," held at Berlin on the 12th of July, 1877, it was attempted to found an association with the following objects:—Removal of the compulsion to enter a University, admission to the examinations on the strength of independent private study, release from all the professional and other limitations on study, and the emancipation of free research and free thought from all State or University influence.

This programme, however, was too narrow, and too much bound up with the special circumstances of Dühring's attack. It should have read:—The foundation of a free and wholly independent University for general culture, and excluding special professional studies. It would be easy to prove that such a foundation would meet a real and deeply-felt want. There is a large number of young people, especially of the commercial, agricultural, and industrial classes, but also belonging to theatrical, journalistic, scholastic, and literary circles, who desire to acquire a certain amount of higher culture, without being compelled to take up a special subject such as theology, philology, jurisprudence, medicine, descriptive science, etc. It is true that such students are sent to our actual Universities; but as a rule they cannot find what they want there, as I showed previously, because

provision for these general studies is subordinated to the provision of professional studies and preparation for the civil and State service, whilst there is no organisation whatever for humanistic studies. Hence as a rule the two years of supposed study are taken up with students' diversions rather than with serious work at mental improvement. It goes without saying that such free Universities or teaching institutions, as they already exist in France and Belgium, should be entirely free from any influence of Church or State prejudicial to science, and should give free scope to every philosophic or other system of thought, as long as they remain within the bounds of science. For the rest, such institutions would be profitable for the learned as well as the unlearned professions, since they would provide an opportunity for ambitious minds to equip themselves with a general scientific instruction in preparation for their particular study.

In 1882 a school was founded at Frankfort by O. Volger, which, besides fulfilling a number of other purposes, was to be a "free German University for higher general culture"; but it only very imperfectly attained this end, owing to want of means. It then received a legacy of half a million [marks] through the munificence of a citizen of Frankfort, and in consequence of this and the retirement of Volger it was determined entirely to remodel the working of the institution. The three members of the Darmstadt affiliated society (including the author) who were on the Board of Directors, and to whom, in company with Professor Roquette and Councillor Schäfer, the composition of the new statutes was entrusted, thought it opportune to win over the other members of the committee to their idea of a German University for

higher general culture, and make a beginning at least with the plan. But the Philistines of Frankfort would not hear of it; they declared that what had been left by a citizen of Frankfort was for the good of that town alone. In spite of a long article in the *Frankfurter Zeitung*, in which I explained my plan and its practicability to the people of Frankfort, the shop-keeper-idea carried the day, and the first chance was lost of founding a free German University for higher general culture, which might also have been a rallying-point and support for independent and private teachers, and a refuge for non-official science and teaching. It is true that the resources available for the purpose were very modest. But this would assuredly have improved in the course of time, as the conviction of the usefulness of the new foundation gained ground, partly through the increase of the students themselves, partly through contributions from the wealthy. In any case, a beginning would have been made.

The Frankfort school is now content to invite a number of University professors every year to deliver lectures to the general public of the town; it is, in other words, merely one of the many associations which serve this purpose, and have served it for years, in large and small towns, in the same or a similar manner.

THE "OVER-MAN" IN MODERN LITERATURE.

A SMALL work of the historical writer, Leo Berg, with the above title, has for its frontispiece the figure of an ape wearing the mask of a lion. It would be impossible to give a better characterisation of the whole of the foolish literature which has been called into existence by the "over-man" of Friedrich Nietzsche. Weak or weakly natures seek to give themselves an air of importance, which they would never have otherwise, by the cult of the "over-man." These followers and defenders of Nietzsche would have learned by a single glance into history that the "over-man" is not something new, as they imagine, but something ancient, barbaric, and opposed to modern thoughts and sentiments. The tyrants and irresponsible rulers of ancient times and of the Middle Ages, before whom their people and subjects bent in slavish subjection, were in their way "over-men." The phenomenon continues far into the history of civilisation, and is found in the East even at the present day in its political form. Cæsar, followed by the whole series of deified Roman emperors—Attila, Dschingiskan, Charlemagne, Akbar, Philip II., Frederic II., Napoleon I., and many others—were over-men in the literal meaning of the word; times and nations had to bow to their will, just as we find in the East or amongst the African savages at the

present day. It is true that Nietzsche's over-man has only a distant relationship to these over-men of history and of the lower stages of civilisation, since it thinks less of external power and more of an increase of self-consciousness. But what is this self-consciousness without the power of making others feel one's superiority but a morbid fancy and self-elation, "nourished," as Berg rightly says, "by the blood of narrow-chested teachers and diseased writers"? Certainly those who find most traces of the over-man in themselves are the very least disposed to advertise it; whilst those who are the least justified in talking about it make the greatest noise. They are—with few exceptions—apes, who prefer the lion's mask and imitate its roar, though without being able to terrify the fearless. We might pass over these follies with a shrug of the shoulders if, unfortunately, there were not a partial decay or reaction in the art and literature of the day associated with it. A vain imagination and over-estimation of self are not consistent with true artistic achievement.

We should have no fault to find with the notion of the over-man in itself if it were always well-timed and eager to draw up to itself as far as possible the great, blind masses by superior mental or moral force. The masses have never been able to do anything without the guidance and leadership of these masterful minds. But, unfortunately, this is not the rule, either in politics, literature, or art. Brainlessness and evil will only too often play the part which should be reserved for the true over-man, whilst the latter remains in obscurity. Leo Berg describes this well in the following words: "There is no distinctive mark of the over-man, any more than for the true noble. Amongst

rulers of every kind we find slavish natures, and shall always find them, to the confusion of all titles. Who can say that we shall not find amongst the oppressed, the poor, the laity, and the ignorant, the higher natures, the really noble souls, who are only held there by chance and misfortune? Once, in the days of Christian philosophy, it was said that the beggar is the true king. Deeper inquiry has taught us that the beggar is generally a scoundrel."

Even from the literary reputations of our time it can easily be shown how uncertain is the mark of the over-man. Take, for example, the wretched work of Langbehn, *Rembrandt as an Educator*, with its forty or fifty editions, or think how the mad philosophy of Nietzsche was able to win over innumerable weak minds and provoke a whole literature—examples which could easily be drawn into a long list, if the proverb, *Nomina sunt odiosa*, did not forbid it. Remember, too, how difficult it has been for the greatest literary over-man that ever lived—if the expression be permitted—to secure the recognition of his contemporaries. His example shows also how unnatural and far-fetched the phrase "over-man" is at bottom, and how it is only calculated to inspire quite erroneous ideas and, in weak hearts, false ambitions. Shakespeare was not an over-man in Nietzsche's sense, but a full and complete man in the best meaning of the word, and one who would have only laughed at the Nietzschean idea. He pondered over the loftiest heights and deepest depths of the human heart, and weighed the most difficult problems of humanity in his giant mind. But it would never have given him a moment's gratification to be elevated *above* humanity, and fall into the

intoxication of an over-mannism that outrages all reality. He describes such an over-man in his Prospero, who does indeed control nature, but only by reliance on the superstitious ideas of his time as to the possibility of magical arts, not as raised above humanity itself. He even makes his fanciful over-man become a man again after the accomplishment of his dramatic purpose. In complete opposition to this Christianity makes a god of man. Nietzsche, who, however, professes to be a strong opponent of Christianity, could not have chosen a better illustration of his theory; in that case he would only have pleased the theologians, whereas now every poor scribbler is minded to claim for himself the glamour of the over-man. The irony of fate has shown in Nietzsche's own case what this elation must lead to in minds that take it seriously; it is, as Berg says, "the human ruin of the philosophic over-man, the failure of him who would prefigure the humanity of a thousand years hence, the casting of the champion of irresponsible egoism on the sympathy of an altruistic society. All that is, as the case of Heine, an illustration of the contradictions of our civilisation. Those who feel them most deeply, who withdraw the farthest from the world of feeling and thought of the older society, must also exhibit the typical issue of these contradictions."

The theory of the over-man will probably continue to haunt literature for some time, even after people have ceased to talk of the philosophy of Nietzsche; but it will eventually pass from memory, as so much of the kind has already done, and only be known to posterity in the history of literature.

SCIENCE AND MATERIALISM.

DR. HANS BUCHNER published a study some time ago with the above title, which, however meritorious in itself, calls for some correction on certain points from the point of view of the system he attacks. Dr. Buchner says, in defining materialism, that "its real nature consists in an equally confident and naive assertion that not only the world in general, but the processes of life and thought in particular, can be explained on purely mechanical principles." However frequently this or a similar definition may be used in anti-materialistic literature, it is none the less incorrect. If materialism were in a position to give the "explanations" of Dr. Buchner, there would be no further possibility of conflict; the matter would be ended. But the philosophic tendency which usually goes by the name of "materialism" has never been guilty of such arrogance. In particular, the present writer, so much decried as a "crass materialist," has never lost an opportunity of affirming the insolubility of the world-riddle, or the inexplicability of the last ground and final connections of things. But at the same time I have thought fit to add that materialism is no more inconvenienced by this inexplicability than its philosophic opponent, spiritualism, which is just as little, and perhaps less, able to give that explanation by means of the spiritual

principle it alleges. Explanations are not always obtainable. When, however, we are not in a position to "explain" even the simplest phenomenon which is accessible to observation—for instance, the combination of two chemical elements to form a third, or the mechanical action of electricity, or the speed of light, or the growth of a plant, an animal, and so forth—we must content ourselves with recording the fact. In this way we have recorded the fact of the connection of force and matter, or of the psychic and the physical, without being able to account for their inner causes and connection. The man who always seeks explanations, instead of recording facts and observations, is not a sound scientist. It is true that these facts or observations need to be logically connected, and to have general principles deduced from them, before they can be of service to a particular view of the world or life. But this belongs to the province of natural philosophy rather than to that of special scientific investigation—a province for which all scientists have not an attraction. As a matter of taste, Dr. Buchner is entirely wrong when he censures his colleagues so severely for their "lack of logical and critical training." Perhaps he has been unduly influenced by the contents of a work of Dr. Adolf Wagner (*Letters of a non-modern Scientist*), which has served as a basis of his remarks, in which the author makes a vigorous attack on the observing and experimenting scientists of the day, and describes them, almost without exception, as philosophic Beotians and gross materialists, who in their naive self-deception believe in utterly unprovable things, and live in a world of dreams rather than realities; who "have a positive hatred of every philosophic

idea which does not run in the channel of mutually chasing atoms and molecules"; who are even "incapable of following up the results of their own sciences to their logical consequences," etc. Consideration for his own colleagues and the dignity of science as such should, I think, have restrained Dr. Buchner from lending a ready ear to such groundless attacks, proceeding from a philosophic misconception. If he had seen the exhaustive description and analysis, which I wrote in the *Gegenwart*, of Wagner's work, full as it is of an almost offensive self-consciousness, his praise would have been somewhat moderated. He would then perhaps have doubted whether, as Wagner and his retailer consider, Kant and Schopenhauer are the right guides to the science of our day, and whether, as Wagner thinks, these two philosophers have contributed more towards future world-theories than all the valuable knowledge accumulated by science. They have rather, on the contrary, more or less barred the way to such theories by restricting our knowledge to the phenomenal world and the ego, which bears the whole of the outer world within itself. The unfortunate habit of the idealist philosophers, either to construct everything out of the ego, or to play the undignified part of the *ancilla theologiae*, has caused philosophy to toil for thousands of years at the mystery of explaining the world without making a single step of progress; whereas the empirical sciences, which Wagner handles so contemptuously, advance every year from triumph to triumph. It is easy to understand that this leads to a feeling of contempt or belittlement of the barren speculations of professional metaphysicians on the part of the representatives of science; and the severe

censures which Wagner passes on science on that account are the more unjust, as his own theory really leads only to a complete abandonment of a rational explanation of the universe, as far as experience will permit. This theory is not indeed the mental property of Herr Wagner, but merely a repetition of the Schopenhauer theory of the world as will and imagination. The whole of Wagner's work may be regarded as a late and very unhappy attempt to set the philosophy of Schopenhauer, from which sound human intelligence has turned away, on its legs again. The final decision on it, therefore, cannot be other than that which time has long since passed on the singular and solitary thinker of Frankfort and his remarkable theories.

But to return from Wagner to Dr. Buchner: he is really at bottom, in spite of his anti-materialist disposition, quite of my opinion, as expressed at the beginning of this essay. "The complete inexplicability of the causal succession of the processes in the brain on the administration of chloroform, which moreover we meet in all physiological processes, by no means prevents us from recognising a causal necessity." Translated into materialistic phraseology, this would read somewhat as follows: "The complete inexplicability of the causal succession of the natural processes, which we are able to record almost everywhere, by no means prevents us from recognising a causal necessity in the linking of all those processes on which the establishment of a natural order, independent of extra- or super-natural influences, and on the principles of the materialistic school, depends. Even the "instinct of growth" or of "organic construction," based on latent teleological tendencies,

with the assumption of which Dr. Buchner closes his essay, must, therefore, and in view of the recognition of the "theory of evolution," so mentioned by Dr. Buchner himself, be considered wholly superfluous, having long since ceased to play its part as *spiritus motor*.

I will not come to a conclusion without expressing my surprise that it should have been thought necessary to make a fresh attack on what is said to be a "long-since discredited" materialism. It is more than forty years now since the professor of philosophy at Tübingen, G. F. Fichte, published an exhaustive refutation of materialism from the philosophic point of view on the occasion of my publishing *Force and Matter*. Since that time innumerable anti-materialistic works have been published, without being able to prevent the book which was the chief cause of the whole controversy from running through nineteen large German and thirty-two foreign editions. This work does not, indeed, as is usually supposed, take up a "crass materialistic," but rather a monistic, position; and does not profess to explain how the actual connection of force and matter, or of the psychic and physical, comes about, or what is its character in detail. But since materialism, more properly monism, shares this fault, as I said, with all other philosophic schools and systems, the least that it can ask in the interest of justice is that philosophic enfranchisement should no longer be withheld from it by the partisans of the older schools in their attachment to traditional teaching. And it has derived from the gigantic progress made by the exact sciences in the nineteenth century, which I have described in detail in my recent *At the Death-bed of the Century*, a help which it greatly missed as long as it had only reason for its support.

FROM THE NEBULA TO MAN.

THERE can scarcely be a feeling more stimulating to human pride than that which is inspired by a glance at the thousands and millions of years which lie behind the evolution of the human race and the preparation for it, and at the position which man occupies, as head and crown of the universe, at the summit of this evolutionary process. This pride must grow into enthusiasm when we remember that it is possible for human science and thought to trace this process back to its earliest beginnings, and to survey at one glance the immense stretch of time that separates the present from that distant past. There are, it is true, many gaps and obscure passages in this survey; but they are not too large to be bridged over by philosophic and logical thought. They reveal the imperfectness of our knowledge, not of things; the strong, unbreakable thread which binds together this whole history of the macrocosm and the microcosm shines unmistakably through the mists that impede our vision from time to time.

Who would have thought it possible a few decades ago that we should discover the beginning of this thread, and be in a position, through the extraordinary perfection of our telescopes and the aid of spectrum-analysis and the art of photography, to witness the earliest phases of the formation of the world, or catch

a glimpse of nature's creative force in its first efforts at this formation? From the deepest depths of the heavens, from distances that can only be reckoned by millions of light-years, the light is borne to us of the wonderful nebulae which are now known to be world-systems in the act of construction or development. Beginning as chaotic masses of cloud, spread over inconceivable distances, and with the formative matter in a state of extreme attenuation or dissolution, they gradually draw themselves together under the laws of gravitation, and finally, by means of a rotatory movement, become orderly systems of suns and planets, of which we have a model in our planetary system. That this process is a real, and not an imaginary, one is proved by the photographic picture which Mr. Roberts has taken of the well-known nebula in Andromeda, with his twenty-inch reflecting telescope. The picture shows a widespread nebulous mass, gathered about a central nucleus, which has divided into a number of rings with several clear condensations; whilst several apparently isolated nebulous bodies, or thicker knots of light, are in the act of detaching themselves from the great nebula. All is just as it should be according to the familiar Kant-Laplace theory of the formation of the world.

The dissolution of the material forming the primitive nebula was so great originally that, according to Helmholtz, a single gramme of ordinary terrestrial matter would, if so expanded, fill a space of many million cubic miles. If, for instance, we conceive the whole of the mass or ponderable matter of our planetary system, including the sun, to be distributed into a sphere of the diameter of the outermost planet known to us, Neptune—and the nebulous sphere out

of which the system has evolved must have originally had such an extension, and probably a much greater one—the attenuation would be so great that the density of the nebula would be only the 553-millionth part of the density of atmospheric air. If we suppose, with some astronomers, that the nebulous sphere of our solar system must in reality have had a diameter of two billion miles, it must have been 600,000 billion times less dense than hydrogen, the lightest of all terrestrial bodies.

How inconceivably vast, therefore, in point of space and time, must have been the evolutionary phases which were passed through before our earth became a solid and independent heavenly body, and then repeated in itself the same or analogous phases of evolution. When it had started its revolution round the residuary central body, in harmony with the general rotatory movement, a series of processes set in within it which brought about a continual condensation of its mass. The fire which inevitably resulted from the condensation, and which the ancients, with their imperfect knowledge of the origin of the world, believed to have mounted upwards, in the supposed separation of the solid and the fluid, to form the brilliance of the firmament, retired deeper and deeper into the bowels of the earth, and reveals its presence there to-day by the increasing warmth of the earth's interior, by hot springs, volcanic eruptions, and so forth. On the other hand, the familiar destructive action of the atmosphere began its work on the cooled surface, the masses of aqueous vapour that surrounded the sphere having been first precipitated on its surface as a hot ocean, covering it to an equal depth in the beginning. But the struggle between the external

destructive and the internal constructive natural forces and influences was bound to leave behind it easily recognisable traces of its existence—traces from which the learned have read, as from an ancient chronicle, and reconstructed for us, the story of the earth's development. A long series of strata, originally lying evenly on each other, but much modified and confused later on, which were gradually deposited at the bottom of the sea, to be thrust upwards in time by the pressure from within, enable us to read to-day in chronological order the whole connection of these processes, which have absorbed enormous periods of time in their action.

As to these processes themselves, they have a special interest and importance because they proceed simultaneously with the gradual formation of the world of living organisms, which have gradually arisen by slow and secular evolution from the lowest beginnings to the astonishing height that culminates in our own race. Millions and billions of living things must have lived and died before that result could be attained. The first and earliest representatives of these creatures are inaccessible to our knowledge, as their structureless, uniform, albuminous body offered no possibility of preservation down to our own times. Countless generations of those protoplasmic beings (called "monera" by Dr. Haeckel) may have lived for thousands of years in the depths of the primitive ocean that enveloped our cooled planet before the increasing variety of the conditions of life made possible their gradual elevation to higher forms. But it was not until these primitive beings began to clothe themselves with shells of lime, offering sufficient resistance to destructive influences, that they could be

preserved, and so become witnesses to us of the remote past.

From these protoplasmic beings has descended the whole series of organic species, ever progressing from the simple, imperfect, and lowly to higher formations. In proportion as the land raised itself out of the water the air-breathing animals of the former advanced beyond the gill-breathing animals of the latter. But millions of years had to elapse before the *archolithic* or *primary* period, in which at first only the lowest plant and animal forms could live on the floor of the still heated or luke-warm ocean, advanced as far as the development of zoophytes, molluscs, worms, some of the crustacea, and the lowest of the cryptogam plants, the algæ; and further millions of years went by before the history of the earth entered upon the great period of the fishes and fern-forests. Towards the close of this great period, or in the Silurian epoch, which has formed a deposit not less than 6,000 meters in thickness, the ocean was alive with invertebrate animals of all kinds, of which the most remarkable were the trilobites or three-cornered crustacea.

Even in the following, or *tertiary* period, the two highest classes of animals, birds and mammals, were still completely absent. On the other hand, with the increasing separation of land and water the first land plants and animals make their appearance; but aquatic life was still so far predominant that the whole period has been called the age of *fishes*, so numerous and varied they were, though not yet advanced to their most developed type, the bony fishes. Moreover, it was during the middle section of this period that the plant world attained the great development in the warm and moist forests of what is called

the carboniferous formation, which is so useful to us to-day. Naturally, the plants were of a primitive character, but of colossal growth.

Then we have new phenomena in the animal world, as it gains ground on the earlier dominion of the water—namely, air-breathing articulates and vertebrates, the latter in the form of amphibia or lizards, creeping along the ground, which could live either in the water or on land. The variety of their forms was continually increasing, whilst the plants of the carboniferous epoch were gradually replaced by the more highly developed pine-trees. Towards the close of this period we meet the first representatives of the reptile class, which form the lowest order of the higher vertebrates, and characterise the second great section of the earth's history, the *secondary* period (also called the *mesolithic* age). There is, however, still an enormous abundance of all kinds of fishes.

The immense development of the plant world during the preceding period had relieved the atmosphere of its earlier excess of carbonic acid, which was injurious to the life of the higher air-breathing animals, and had stored up the chief ingredient of this gas in the ground in the form of coal. That prepared the way for higher animal life on the earth, which advanced from one stage to another, whilst the older forms of life retrograded, or even disappeared altogether. Besides a rich flora of higher plant-forms and the highest development of the cephalopods, those voracious thieves of the mollusc world, which had already existed in thousands of forms in the Silurian age, there appeared most of the new and interesting forms of the vertebrate class. Corresponding to these amongst the fishes, the bony types make their appearance for

the first time, and gradually oust their imperfect predecessors with cartilaginous skeletons. The amphibia and reptiles are developed in immense number and variety, and arrest attention with their fantastic and, to a great extent, colossal forms; with these are associated a few bird and mammal forms as heralds of the approaching period. Everywhere we find an effort of nature to fill up every position in its household with increasingly perfect individuals.

Taking another step forward, we come to the *tertiary* period; it comprises scarcely the three-hundredth part of the history of the organic world, yet its duration must be reckoned by hundreds of thousands of years. In this age of mammals and leaf-forests we find an increasing preparation for the actual condition of things, connected with changes in the surface of the earth itself which make for individualisation. Whilst the immense forms of amphibia and reptiles, which characterise the preceding age, disappear more and more, there appear the earliest predecessors of our actual ungulates, ruminants, and pachyderms; at their head, as the common ancestor of all the more important tertiary mammals, is the recently-discovered *phenacodus primæus*, the existence of which was affirmed as necessary, long before its actual discovery by Professor Cope, with as much confidence as Leverrier had proclaimed the existence of the planet Neptune before it was actually discovered. The favourable climate of the tertiary period gave rise to a great variety of higher vertebrates, far surpassing all that the most luxuriant spectacles of the tropics present to the eye to-day.

The next great division of the earth's history, the *quaternary* or human period, the last and highest stage

of terrestrial evolution, brings forth on the stage of life the highest type of creation, our own race or man, the summit and zenith, in a sense, of its graduated development; he was preceded by a longer or shorter succession of half-animal ancestors or preparative forms in the course of the tertiary period. In him nature has, as it were, come to a consciousness of itself, and is enabled to contemplate itself in this mirror of consciousness, and take scientific account of the great evolutionary process I have described. This, however, could not be achieved all at once, but only after passing through long stages of knowledge marked by all kinds of errors. How long it has taken us to recognise the fossil remains found in the earth for what they really are—the remains of animals, analogous to the one we are familiar with, that once lived on the earth! How long were they not regarded, with inconceivable blindness, as mere sports of nature, or as experimental works on which the creative power had practised, as it were, before producing the later, more perfect forms! The earth has faithfully preserved these forms for us, to the joy of those great men to whom it was reserved to learn the truth and to show the broad connection that runs throughout the organic world.

This could not, as I said, be done in a day, but only after countless intermediate stages in the organic development of the human race itself—on the analogy of the antecedent evolutionary processes. The general tendency of these processes, mainly in the direction of human development, is shown by the remarkable fact that all the animals of earlier ages had *very small brains* in comparison with their successors of the present day. The brain of the actual

horse, for instance, is colossal in comparison with that of his nearest relatives of the tertiary period. The birds of the cretaceous period had brains which, in proportion to the size of their bodies, were only one-third the size of those of their living relatives; the dinosaurs of the Jurassic period had brain cavities which were comparatively much smaller than those of any reptiles that exist to-day, even though much lower in the reptile scale. The rhinoceros of to-day possesses a brain *eight times* larger than that of its former ancestor, the elephant-like dinocerate of the tertiary period, although it is much smaller.

It need not be said that man far surpasses all other earthly beings owing to the more perfect development of his brain or organ of thought. But how long it has taken for him to learn to use this organ so as to ascend to the heights of modern civilisation, or to be changed from a wild, half or wholly naked, wandering savage, led by the lowest instincts, into a being worthy of the dignity of manhood, a conscious, moral being, controlling nature by the power of his mind! What a distance there is between us and this prehistoric human may be gathered from the sketch that Carl von den Steinen has recently given us of the savage races of Central Brazil. They have not even yet reached the prehistoric stone-age, but live in the age of wood, bone, and shell, are devoid of all feeling of modesty and quite naked, have no domestic animals, live chiefly by fishing, have no other weapons but the bow and arrow, or wooden missiles and clubs, cannot count above two or three—twenty at the most, make fire by rubbing two sticks together, make hardly any distinction between themselves and the beasts, but merely regard themselves as *primi inter pares*, have

very elementary ideas of right and morality, but have most absurd beliefs in witchcraft and magic, and so on. They present to us to-day the living picture of what our race once was. Compare with one of these savages, never looking beyond his immediate surroundings and living only to satisfy his animal wants, the civilised man of to-day, who has measured in thought the most remote distances of the envioning universe and traced the harmony of the heavens; who has watched the great cosmic systems in the earliest stages of their development, and has learned, by analogy, the origin, constitution, and movement of our own habitation, the earth; who looks back with comprehensive survey over the millions of years that have been absorbed in the formation of our planet and its living population, and has rendered more or less transparent the veils which seemed to hide for ever the "mystery of mysteries"—that of his own origin; who has learned the great law of the conservation of energy, and with its aid has discovered the ultimate source of all the forces and movements that are active on the earth in the rays of heat and light, which our gigantic day-star pours uninterruptedly upon the earth; who has learned to understand the language of light, and thus has obtained information as to the physical and chemical constitution of heavenly bodies which are millions of light-years away from us; who has, by means of the wonderful art of photography, forced the sun itself to register in a dark camera the images of the objects it illumines; who makes the darkest rooms as light as day by electric light; who has probed the nature of the nervous principle, and measured its speed, as well as that of thought; who has, by means of his wondrous gift of invention,

constructed instruments which enable the eye to penetrate, not only into the profoundest depths of the heavens, but into the no less profound depths of the smallest creatures, and discover the causes of the most devastating maladies in tiny, microscopic organisms; who has made it possible to overcome the limits of time and space by means of a simple wire, and transmit his thoughts to any quarter of the inhabited earth almost with the speed of lightning; who has invented machines which carry us over land and sea with the speed of the wind, or even of the storm, like Goethe's famous magic cloak; who has pierced vast mountains that rise above the snow line in order to permit the commerce of nation with nation, or bear for us the released molecular forces to the highest summits of the mountains; who ascends in balloons to the breathing limits of the atmosphere, or with the help of the X-rays enables the eye to pierce into the interior of hitherto opaque bodies.

When we remember all that has been done in the nineteenth century alone for the advance of human knowledge and power, we shall face the future with pride, and trust that the new century will outstrip the nineteenth as it outstripped its predecessor. And when, at the close of the twentieth century, some author of the time will attempt to summarise the long evolution of existence "from the nebula to man," he will probably find himself in a much better position to approach his task than the writer of the present essay.

THE ORIGIN OF MAN.

THE question of the origin of man, or “the question of all questions,” as it was called by the famous anatomist, Professor Huxley, cannot be solved by means of metaphysical and mystic speculations, and without an acquaintance with the facts of science, but solely by means of biological and zoological investigation. This solution, which earlier times considered to be an absolute impossibility, has been found by modern scientific research, as we are assured by the distinguished follower of Darwin, Professor Haeckel, in his work on *The Present Condition of our Knowledge of the Origin of Man*.¹ There are three great scientific documents which have to be consulted on the question; they are the sciences of palæontology, comparative anatomy, and ontology.

In the first place, modern comparative anatomy has revised Linné's old order of the primates, in which he comprised the apes, half-apes, and man, and which was drawn up in favour of the Blumenbach distribution; and it has proved the internal anatomic unity of the primate stem. The phyletic or ancestral unity of the primate stem, from the oldest lemurs or half-apes to man, is, according to Haeckel, an historical fact. All the primates—apes, half-apes, and men—

¹ The English translation has the title of *The Last Link*.

descend from a common primitive form, which may be called the *archiprimas*. As to man in particular, he is descended from an extinct species of Eastern apes, or catarrhinæ (narrow-nosed apes), which form a natural group with a common ancestor, and are in turn to be traced, directly or indirectly, to the half-apes.

“The whole of our feeding, digestion, circulation, respiration, and metabolism are effected by the same physical and chemical processes as in what are called the anthropoid or man-like apes (gorilla, chimpanzee, orang-outang, and gibbon). Our sense-action follows the same physical and chemical laws. The mechanism of our skeleton, and the movements which our muscles effect by means of this lever-apparatus, do not differ from those of the anthropoid apes. Man’s erect attitude, so frequently alleged to be a distinctive trait, is also shared at times by them, especially by the gibbon.”

It is the same with man’s speech and psychic activity ; the transitional and intermediate stages are found on all sides. Impartial criticism confirms Huxley’s law, that the differences in bodily and mental constitution between man and the nearest related anthropoid apes are smaller than the corresponding differences between these and the lowest apes. The highly-developed brain-structure of man is completely foreshadowed in the brain of the ape, and has been gradually developed from the same embryonic feature as in the case of all the other vertebrates. Man’s consciousness and higher psychic functions are effected by the same physical and chemical processes in the brain as in the case of all the other mammals. It is the same with mental diseases in man and the beast. Further, the vast distance between the psychic life of the highest and that of the lowest representatives of the human race (the Veddahs, Akkas, Australian negroes, etc.) is far greater than that between the latter and

the man-like apes. Psychology, as it is found to-day in most manuals and academic lecture-rooms, is not a true empirical science of the soul, but rather a fantastic metaphysic, made up of one-sided self-observation and speculative delusions, without any regard for anatomy, physiology, and experimental psychology. The recent discovery of the four great centres of thought or of association in the brain by Professor Flechsig as the only real instruments of our mental life puts an end to all the misleading dualistic opinions which are still generally prevalent as to the origin of the central psychological mystery, as well as to the dogma of the immortality of the human soul.

As regards the second great scientific document, palæontology, we find here at length the discovery of the "missing link," or the connecting link, the lack of which was, and is, continually appealed to by the opponents of the natural origin of man. It is the *pithecanthropus erectus*, a few remains of which were found by Dr. Dubois in Java and submitted to a committee of twelve experts; three of these attributed the remains to a man, three to an ape, and six to an extinct form between man and the ape. All the subtle objections which Professor Virchow raised to the discovery, in his persistent hostility to the theory of descent, must be considered as completely shattered. Quite recently a gigantic fossil half-ape has been found in Madagascar by Forsyth Major, which comes very close to the human stature—a discovery which seems to be particularly important, as the genealogy of the human type is probably to be traced rather to that of the half-apes than to the anthropoid apes. There have been so many discoveries of the remains

of numerous extinct primates of the tertiary period in recent times that we may say with Haeckel: "The general outlines of the ancestral tree of the primates from the earliest Eocene half-apes to man lie clearly before our eyes in the tertiary period; there is really no longer a 'missing link.'" Naturally this fact cannot be proved in the sense of the so-called "exact" school—namely, by showing each one of the transitional forms of a period of over a hundred million years; but the same must be said of all other historical facts.

Moreover, the historical succession of the chief stages of the whole vertebrate stem through a long series of past earth-periods has been established beyond doubt by recent research, in spite of a few gaps; "and this gain is much more important for the ascertaining of our human genealogy than if we had succeeded in putting clearly before the eye, in a hundred fossil skeletons of apes and half-apes, the entire series of our tertiary primate ancestors in complete connection."

At the end of his fine work Dr. Haeckel casts a glance at progressive heredity, rejected by Weismann and his school, without which the continual advance of the human race to higher stages of development would be inconceivable. "Those who reject progressive heredity," says Haeckel, "have recourse to mysticism, and then it is better to admit the mysterious creation of individual species. Anthropogenesis itself furnishes innumerable proofs of it."

The theory of evolution in its actual form will, Haeckel is firmly convinced, be acclaimed by the science of the coming century as the most important mental achievement of our time. The luminous rays

of this sun have, he thinks, dissipated the thick clouds of ignorance and superstition which have hitherto spread an impenetrable gloom over the most important of all problems of knowledge, the question of the origin of man and his place in universal nature.

THE LATEST ABOUT PROTOPLASM.

It is now more than half a century since the ultimate primitive form of the organic world of plants and animals was believed to have been discovered in the cell, a tiny vesicle filled with fluid. Every animal and every plant, so it was concluded, is nothing else than a more or less complicated association of more or less modified cells, or a complexus of cells; whilst the lowest organisms remain in the uni-cellular stage of simplicity.

But it soon became evident that, in the first place, this cell-structure did not offer the regularity or constancy of construction which was expected of such a primitive form; and, in the second place, that it was itself far too high or complicated on organic structure to be taken for the beginning of all organic formation. It was found that the cell itself arises from a still simpler and more primitive material, called protoplasm, which takes the form of semi-liquid nodules of albumen, capable of nourishment and growth, and connected with each other by an extremely fine network; in these all the organic functions are not associated with particular organs, as in the case of the higher animals, but flow immediately from the formless organic matter. They are consequently just on the border between the organic and the inorganic, and clearly show how the organic form develops by degrees

from more or less structureless compounds, by influences and agencies which we cannot discuss more fully here.

Professor Kassowitz, in his distinguished work on protoplasm (*General Biology*), describes it as a mixture of solid and fluid parts, the former being bound together in a continuous association by means of a supporting structure, a sponge-like skeleton, saturated with fluid. It is in this mixture, and not, as was formerly supposed, in the humours, that all the metabolic processes take place in the living body according to chemical and physical laws. "Recent investigations have put it beyond dispute that the cell-membrane, which was formerly supposed to effect the metabolism by means of endosmosis and exosmosis, is really quite a secondary matter; and that what is really living and active in the cells and the organism generally, that breathes, assimilates, moves, and secretes, grows, and forms special parts, is precisely the mysterious substance we now call protoplasm."

The food introduced, whether organic or inorganic, is not partly burned up in the blood, as was formerly thought, but goes to the formation of the protoplasmic molecules; and the waste-products resulting from the death or disappearance of a protoplasmic structure also come solely from the destruction of the living substance. We can, therefore, only regard a material or a compound as nutritive when it serves to build up protoplasm-molecules; and this again can only happen when the existing protoplasmic-molecules exercise an assimilatory attraction on the substance in question.

As regards this assimilation, or the conversion of the food introduced into protoplasm, which Professor

Kassowitz has followed with great skill and learning in its manifold details, and in which all growth of protoplasm is accompanied by a process of oxydation, all the vital movements of protoplasm and organisms generally may be reduced to the elementary processes of the formation and decay of highly complicated and unstable atomic combinations. In this way we also obtain a tenable view of the chemical and physical constitution of protoplasm and its infinite variety. We must conceive the molecules of protoplasm to be uncommonly large and very complicated combinations, of the extent of which we can form an approximate idea when we learn that the colouring matter in the blood, which we can only regard as one of its waste-products, consists, according to recent investigations, of at least 2,295 atoms, whilst we are forced, on the basis of the Raoult method, to run the magnitude of a molecule of pure albumen up to 15,000.

“ And since the utmost variety of combinations of atoms and groups of atoms is possible in so gigantic a molecule, this gives us theoretically an equally endless wealth of variations in the combination of the molecule of protoplasm (on its chemical and physical side). Thus we can understand for the first time the indisputable fact, dominating the whole of biology, that protoplasm, in spite of its apparent identity of composition, nevertheless offers an endless variety of material and dynamic properties, not only in different species, but even in different individuals of the same species, and again in the different organs and tissues of one and the same individual (muscular fibre, glandular cells, nerve-fibres, etc.), and that it is able to transfer these individual properties to all the new protoplasmic parts that arise under its molecular influence. We can thus understand, not only the constancy of physiological properties in one and the same protoplasm, but also the possibility of an endless variation of these properties in kinds of protoplasm which differ in their chemical structure.”

If, for instance, a dog is able, as has been proved, to pick out the track of its master from a great

number, by means of its sense of smell, and keep to it in spite of various cross influences, it follows that specific olfactory material is emitted from every man, which can only have an individual character because it comes from the protoplasmic molecules which have a specific character in every individual. It is also a well-known fact that no individuals amongst the more highly developed animals and plants ever agree entirely and in all parts, although they all arise in the same way from an ovum, in which the germ-plasm must be regarded as the vehicle of all the future properties of the developing organism.

As to the anatomic features of these protoplasmic processes, observation can give us no information, in view of the extraordinary fineness of the structure and organisation of protoplasm, even if our microscopes were improved a thousand times; in this synthetic reason must take the place of direct observation. But, however inexplicable and unintelligible the principle of life may be in itself, we can at least say that it has nothing to do with the earlier theory of a vital force, whether this be conceived in the fashion of the older Vitalists, or that of the recently-increasing Neo-vitalists. It is true that we must reserve an exceptional position for the synthesis or assimilation, as something not found in the inorganic world; whilst we can explain the destruction or regressive metamorphosis as a chemico-physical act. But, apart from the circumstance that reason necessarily protests against such a division of the vital process into two mutually-opposed activities, there are actually cases of anorganic assimilation in the province of chemistry, and the number could assuredly be increased if more attention were paid to these important facts, with which Vitalism

is cut off from one of its last refuges. Assimilation is probably a process existing throughout the whole of nature. Moreover, the assimilative process in the living organism strikingly recalls a well-known phenomenon of the inorganic world, which is best described as elective crystallisation. If we compare these processes with what we have so far learned of the chemical and physical structure of protoplasm, we at once see the possibility of forming a clear idea of the assimilatory mechanics of living protoplasm. Thus, for instance, we can, with a little hypothetical assistance, reduce the contractility of the muscles to clear and mechanically intelligible processes, and put them on the same footing with the contractility which even lifeless structures exhibit under certain circumstances. An elastic thread or a spiral spring is contractile when the strain is removed. The strain or stretching-force in these illustrations is represented in the organism by the vital process of the assimilatory growth of what is called the myoplasm [muscle-plasm]. But as soon as this myoplasm, which has exercised a powerful strain lengthways on the neighbouring parts in its growth, is disturbed by a stimulating process, the contractility of the muscle comes into play in the same way as in the artificial arrangements, when the cause of the strain is removed from them. The muscle is only distinguished from these dead contrivances by the circumstance that both in the application and the removal of the strain distinct vital processes come into play. "But since we have succeeded, on the basis of our fundamental hypothesis, in reducing the assimilatory energy of the protoplasmic molecules and their chemical instability to properties which are also found in a lesser degree

in dead matter, we may in the same way achieve the hitherto vainly-attempted task of reducing the contraction of the muscles to known physical and chemical processes in organic nature."

Protoplasm has the property of sometimes extending, at other times contracting, by active growth under the influence of vital stimuli, the points of attack of which must be its highly complicated and chemically unstable molecules. This is accompanied throughout by a process of oxydation, which leads to a continual movement to and fro of its smallest particles in the most varied directions, or a confused complexity of its respective movements. There is a constant alternation of the processes of growth and of destruction or execration. The most direct effect of the latter is the concentration and breaking-up into simpler atomic groups of the molecules which are directly affected by the stimulation.

Professor Kassowitz differs from the majority of living physiologists in rejecting the *spontaneous* movement of protoplasm, taking his stand on the law of inertia, known since the time of Galilei, according to which *no body can change its own condition*. What we consider impossible in all the rest of nature cannot be possible in living things—for instance, in the actively moving protists. Spontaneous contraction, in the literal meaning of the word, is just as unthinkable as spontaneous elongation. In animals and plants it is always external stimuli that enkindle and sustain the process of life; and the whole of this process in its various phases is nothing else than a construction and destruction of protoplasm, whether it appears in the form of a simple amœba or a white corpuscle of the blood, or in its various conversions into the organs

and tissues of the body. We may not be able to point out the sources of the stimulation in every case, but we are not therefore justified in concluding that it is not present at all. According to the axiom that the source of every movement is outside the thing moved, it seems most reasonable to abandon once for all the notion of really spontaneous movements.

The attentive reader will have noticed from this brief survey of Kassowitz's work that the conclusions of the learned writer are not reached without the assistance of a few more or less hypothetical considerations. But as no scientific discipline can dispense with hypothesis in its progress, that cannot be matter of reproof. On the contrary, it seems to me that it should prove an additional incentive to the author's colleagues to make themselves acquainted with his views and form their own opinions. In any case, however, they are so interesting and stimulating for learned and unlearned alike, in one of the most important questions of general biology, that we cannot be sufficiently grateful to the author for his careful work, and may confidently predict a well-merited success for it.

MORE ABOUT PHILOSOPHIC MATERIALISM.

THE remarks of Dr. Adolf Wagner, chiefly directed against me and my philosophic system, under the above title,¹ compel me to make a brief reply. This would have been an easy task if I had adopted the methods of my opponent. It is very convenient merely to pass sentence on your opponent's theories, instead of laboriously refuting them and making a serious study of them, in the expectation that the reader will take it all on faith. "Antiquated, crude, unscientific system," "lack of profound thought, independent judgment, and logical training," "one-sided, poor, superficial, uncritical speculations," "childish stage of philosophic thought," "wild metaphysics," "lowest or rudimentary stage of scientific consciousness," "naïve realism," "coarse, defective critical faculty and lack of a theoretical basis," "necessity of training in theory of knowledge," "perplexity and hopeless shipwreck": that is a fine bouquet of the choice phrases with which Dr. Wagner describes his opponent's system—a system which would seem scarcely worth meeting or refuting under such circumstances; it would have been enough to send its defender to school or to a college of logic.

¹ In a supplement to the *Allgemeine Zeitung*.

The only source of consolation for such a defender in face of these overwhelming charges is the fact that he shares his sad fate with the majority of living scientists. They fare no better at the hands of Dr. Wagner, on account of their ignorance of philosophy and perversity of thought. In his eyes they are almost all philosophic Bæotians and crass materialists. In the very beginning of the article in question he reproaches our scientists with "plunging into the antiquated system of scientific materialism, and now being unwilling to listen to reason." Hence Dr. Wagner despairs of the conversion of the older scientists, and puts his trust in the younger generation, which will venture to rise to a higher stage of intellectual development (*à la* Wagner) and have the qualification of a training in the theory of knowledge.

If I could be content to apply this kind of polemic, like Dr. Wagner, I should merely say that he is a crass "subjective idealist" and takes up a one-sided, antiquated long-abandoned philosophic standpoint, that he is lacking in scientific and logical training, and that he is without the scientific knowledge and accomplishments which would justify him in passing sentence on the aim and methods of modern science and the philosophic consequences deduced from its results. If Dr. Wagner, who has probably read no more of my writings than one of the earlier editions of *Force and Matter*, had seen my latest work, *At the Death-bed of the Century*, he would have learned from it what the impartial philosophic criticism of the day thinks of the philosophic systems of his two champions, Kant and Schopenhauer, and that it would be the height of folly to force modern science into the

Procrustean bed of these systems, as Dr. Wagner wishes. He would also have seen that his theory of knowledge (or, rather, theory of *not* knowing), based on these two authorities, must necessarily come to grief on the rock of the now generally-accepted theory of evolution. It is true that I myself have, in various passages of my earlier writings, attempted to deal (and satisfactorily, I think) with the idealogical scepticism of the day without the help of this theory. But, as this apparently well-grounded objection is always recurring and is the chief weapon of our opponents in the whole controversy about materialism, I have thought it necessary to submit the problem of knowledge to a thorough study in the light of the theory of evolution, and to show that there is nothing in the human mind which has not been imported into it from without in the course of long periods of time.¹

For the present I will only say that Wagner's two philosophical champions were perhaps justified when, without a knowledge of the theory of evolution, they regarded man as a being foreign to nature as such, suddenly introduced into the world with all his faculties and ideas inborn, who only looked out upon nature through the glasses of this involuntary organisation, much as an uninformed spectator regards the proceedings on the stage of the theatre. But since it has been realised that man himself is only a part or a product of nature, and that his faculties and cognitive powers must be in a definite and orderly relation to the natural influences that surround and condition him, these "antiquated" views can be

¹ See *postea*, "Knowledge and Evolution," p. 284.

maintained no longer. As to the particular mental inspirer of Dr. Wagner, no one will dispute that Schopenhauer was an able and learned thinker and had a profound influence on the intellectual currents of his time; but this does not prevent us from passing over his philosophic system as obsolete as over any other philosophy, and from regarding Dr. Wagner's attempt to rehabilitate it as singularly unhappy. If Dr. Wagner appeals to the fact that Schopenhauer is still widely read, since new editions of his works appear from time to time, I could turn this argument, slight in itself, to much greater account in my own cause, as my literary success has been considerably greater than that of Schopenhauer. In any case, interest in Schopenhauer's philosophy seems to have much decreased of late years; his part as "fashionable philosopher" seems to be played out. His inconsistency, or want of clearness, in handling the problem of knowledge has naturally been shared by his pupil, who does not indeed, like Berkeley, venture to deny the reality of the outer world; yet he slips in principles and observations, in establishing his theory of the world "as imagination," which necessarily lead to that result. "Poor, inert, passive matter" is, according to Dr. Wagner, a purely subjective, ideal "product of thought," to which "no reality can be attributed outside of our consciousness." It is a "product of the imagination," or "subjective phenomenon of presentation." We read in his article "that we are absolutely without justification when we affirm the existence outside of us of a real 'matter' besides the sensation of the 'material' which we have"; "matter has no reality outside the presentative consciousness"; "the phenomenal world

is a creation of the intellect"; "atoms, molecules, and undulations of ether are arbitrary notions without a real basis." Finally, we are assured that the whole material world has proceeded from the intellect, and is dependent on it. "The outer world does not exist as such, but is merely an image in our consciousness"; it is a "creation of our subjective cognitive faculty." "All that we know of the phenomenal world is a subjective phenomenon."

The poor scientists who continually devote all their powers to tracing the things and movements of the outer world, and do not suspect that all they know, or think they know, of it is only a subjective phenomenon in their own mind; that the atoms, molecules, and ethereal undulations with which they constantly operate are really non-existent, or exist only in their imagination or subjective presentation, are much to be pitied. It were much better to put aside all our scientific work, and abandon ourselves to the favour or disfavour of philosophers of the type of Kant or Schopenhauer, of whom Wagner says that "the microscopic activity of the whole scientific world has not contributed nearly so much to science as a single brain with their thinking power." Certainly Wagner is no more willing than Schopenhauer to admit that his philosophy involves a denial of the existence of the outer world. Schopenhauer calls such a denial "theoretical egoism and madness." But what else can we conclude from such observations as those we have quoted than a return to solipsism, or to the dream of Berkeley? Otherwise we should have to rest content with the well-known saying of Goethe: "A perfect contradiction is equally mysterious to the wise and the fool."

We must leave it to Dr. Wagner to explain away this contradiction, and to show how the science of the future will have to work on his principles. Considering his strong self-consciousness, and his firm conviction that the speculative philosopher—who, in his esteem, bears the whole outer world within him—is in a better position to understand the world than all the efforts of the empirical philosophers or scientists, he ought not to find it very difficult to accomplish this. If, in doing so, he comes to speak again of philosophic materialism, let me courteously entreat him to abandon the word “materialism,” to which (it is not clear why) a certain scientific odium attaches, and substitute “monism” for it. A philosophic system which puts at its head, not matter as such, but the unity and indivisibility of force and matter, cannot possibly be described as materialism; though the contemptuous treatment which Christian philosophy has hitherto meted out to matter, wrongly considered to be an independent entity, naturally led to the contradiction. Whoever takes a one-sided view of matter may rightly be called a “materialist.” Whoever, on the other hand, attributes everything to force alone may rightly be called a spiritualist, idealist, or dynamist. Whoever regards both in their unity and association, and makes this unity the basis of his thought, is a “monist.” But our opponents prefer to cling to the first appellation, because they think that with it their case is already half established. Yet, when they feel that they must be continually slaying afresh this “long since vanquished” materialism, they betray their own weakness. Materialism is the general scapegoat of science, at which everyone thinks he may have a shot when he pleases, without fearing

a serious reply. Monism is left untouched, because it is not materialism; it could only be refuted by refuting, or proving the non-existence of, the innumerable and solid scientific facts on which it bases its assertions. No thorough examination of our knowledge, except that of ideological scepticism, has ever yet called its foundations into question, or made the object disappear in the subject. In the esteem of those who find satisfaction in such a performance, this scepticism can no more be refuted than monism can in the opinion of those who take up the standpoint of the empirical and evolutionary philosophy. The choice between the two attitudes must be left to everyone according to his own thought and feeling. But the man who puts himself forward in this difficult matter as teacher and converter ought, in my humble opinion, to offer something better than a mere repetition of Schopenhauer's views, which have, as I said, been passed over by the world at large long ago. At the same time, Dr. Wagner might be refuted out of his own master, Schopenhauer. Has he forgotten that Schopenhauer always shows a high regard for science in his writings, and continually recognises its great importance for philosophy, not only in so many words, but also by constantly returning to questions of natural philosophy? Has he forgotten what Schopenhauer says to the philosophers of his day in his criticism of the theological-philosophical concept of the Absolute: "If the gentlemen require an Absolute, I will give them one that possesses all the qualifications of one much better than their cloudy creation; it is matter"? So Schopenhauer himself is a materialist!

THE PROBLEM OF KNOWLEDGE IN THE SERVICE OF SCIENCE.

THOUGH the problem of the theory of knowledge has occupied thoughtful humanity for thousands of years, it has never assumed the importance it has at the present day, when it is, in a sense, the impenetrable shield with which theoretical or transcendental philosophy wards off the attacks of materialist-monistic systems based on science. In these circumstances it is assuredly of no little interest to examine the views on the subject of a weighty and by no means revolutionary thinker of great scientific repute. Dr. J. Reinke, professor of botany at the University of Kiel, admits in his recent *World as Reality* that he was at first captivated, like so many others, with F. A. Lange's observations in his *History of Materialism*, but that he saw on further reflection the untenability of Lange's views and the gross inconsistency of a half materialistic and half idealist-transcendental view of the world. Reinke himself proposes the problem in these words :—

“It is the great question of the doubt: Is all that I hear and see reality, or is it an illusion of my brain, my fancy? Is the phenomenal world within me a picture of things as they really are, or are the two worlds as wide as the heavens apart, even beyond comparison? Do things fall out as it seems to us, or otherwise? Do they happen so very differently that we can really draw no conclusions as to reality from appearances?”

The impartial mind of man has never answered these questions in any other than a sense which was diametrically opposed to that of ideological scepticism, and science has always acted "as if things were accessible to our knowledge through the channels of sense; whilst a philosophic system explains that the world is only a phenomenon and a fiction, and that we can know nothing of things in themselves." On this view, as Reinke further remarks, the real outer world remains eternally hidden from us; we have no knowledge of even its most trivial event. It would, no doubt, be granted that our impressions were caused originally by the things without, acting upon our senses; but we are not allowed to draw any conclusion from these impressions as to the things themselves.

In criticising this view Reinke says it is perfectly true that we only know the material world in so far as it acts on our organs of sense, and these only tell us directly of the effects of things. But it by no means follows that the world is only a figment of the brain, and that "the world for us" is something altogether different from "the world in itself."

"Starting from the fact that sensations are effects which objects have produced in our consciousness, we may say that they are signs by means of which things speak to us. Hence in the excitation of presentations we have a sign-language, through which the outer world speaks to us and makes itself understood. The presentations themselves are the conclusions which we draw from our sense-perceptions as to the outer world.... We may therefore say: A presentation has the same relation to the thing presented as a description to the object described.... Descriptions and illustrations of an object may be more or less correct, and more or less defective. It must, therefore, be granted that our presentations of things are possibly imperfect. But it can only be a question of the *degree* of this imperfection; it is an utterly arbitrary hypothesis to say that our presentations do not

justify any conclusions as to things, or that they are wholly wrong. We should have just as much right to say that our presentations were absolutely perfect images of events."

It is undeniable that the presentations are dependent on things, and that certain presentations must be evoked by certain objects.

"Even colours are signs of certain qualities of things, so that it makes no difference whatever when physiology teaches us that colours only exist in sensations. In any case, the difference of colours is to be ascribed to a difference in the things which evoke the sensation. Certainly the nature of the appearance depends on our sense-organs; but from the changes in the appearances we must infer the diversity of the things which excite them. The differences in the appearances must run parallel with the differences of things."

There is no visible reason whatever why nature should deceive man—a product of nature himself, who has received from her all his cognitive apparatus. We may take a photograph of an object, a rose, for instance. It would be impossible for this photograph to evoke the same presentation in our brain as the original, if the presentation were not a fairly correct interpreter of reality. Another proof of the correctness of our presentations is furnished by our actions, which depend on our presentations, and which only have the desired result when the presentations are correct pictures of objects and are in agreement with them. Moreover, there is a harmony between the returns of the different senses; it would be too wonderful altogether if quite distinct sensations were to lead to identical, though false, presentations. Further, the orderly combination of phenomena in our presentation must have its ground in the things themselves, or come from without. "If this order arose in the subject, how could all men and even the higher animals have the same presentation of it?" The

contested doctrine of philosophy as to the absolute distinction of thing and presentation, or, what comes to the same thing, the absolute incognoscibility of things, which is an entirely arbitrary assumption, violently repudiated by every natural system, would open the door to all kinds of absurdities, and would amount to a bankruptcy of science. Nevertheless, Dr. Reinke does not indulge the hope that philosophy will attach even the smallest weight to his arguments, of which I give compendious extracts. Philosophy, he says, regards its doctrine as a great acquisition, and thinks it has by means of it cut the Gordian knot which no one could undo. If this doctrine were correct, we should have to regard the whole world of sense as merely a creature of fancy, a consistent, gigantic hallucination. The world itself would be nothing but a million-fold cobweb of the brain, born and progressing with man, and disappearing altogether with the destruction of mankind. "It is an indubitable consequence of this famous theory that, if one could destroy all men and animals at one stroke, the whole of nature would be annihilated, because there would then be no presentative brains in existence. Neither the slain men and animals, nor the plants, the mountains, the sea, and the fixed stars, would exist any longer ; only the mystic, impenetrable thing in itself would remain."

In opposition to this, Dr. Reinke formulates his belief as follows: I come to the conclusion that the outer world is not unknowable to us, and beyond the reach of our senses. We have in our bodily organisation the instruments by which we may know it; hence the world is not merely a presentation of ours, but a real object, accessible to our knowledge in the manifold

variety of movements which evoke our presentations. Our intelligence is not merely stimulated by creatures of fancy; our senses by no means misrepresent nature to us. Science does not consist of an analysis of phantasmagories; its object is nature herself, not a swarm of psychological processes. "The link between things as phenomena and things in themselves is the adaptation of our cognitive organ to the perception and correct apprehension of things." Philosophy will, in its high and hollow wisdom, characterise and condemn this attitude as "naive realism"; those who have had no philosophic training will recognise in it, in Huxley's words, the intimate connection of science and sound human reason.

In the further course of his interesting work Reinke shows that time and space are not, as the Kantists affirm, mere subjective forms of our thought or pre-conceived *à priori* ideas, which we bring with us into nature; they are parts of nature herself, from whom we have derived them by way of experience. Possibly they have become hereditary in the course of time, though not as actual ideas, but as a capacity for them. Our intelligence is adapted to time and space perception; without it science might as well cease its labours. Its object, movement, is altogether impossible without time and space, and space is in its turn unthinkable without movement. Ether is therefore a necessary condition for effecting this movement. There is no space without ether. "Here there is great danger for the school-philosophy of being caught in the snares and pits of sophistry, whilst the unprejudiced mind strides safely over them." Like the ideas of space and time, that of causality is not, as the philosophers say, subjective or innate, but an outcome of experience.

Passing to a description of the phenomena of life, Reinke declares that their earlier interpretation by a special "vital force" is hopelessly discredited to-day. "There is no longer question in physiology of the magical powers of an imaginary vital force, but of learning the orderly sequence of the life-process and attempting to reduce the phenomena of life as far as possible to principles which apply to the whole of the material universe." The structure in which the vital phenomena are found in the most concentrated form is, of course, the cell, and its most important part, the cell-nucleus, an extremely complicated structure of the finest build, which differs somewhat in detail in the various types of animals and plants, but is the same throughout in its essential or fundamental features.

This proves the essential identity of all forms of life, or at least lends it a firm support. All the cells that make up an organism arise by division from the first or germinal cell, and this descent of the cell-organs from similar ones goes back through the various generations of animals and plants. From the chemical point of view no other materials are used in the construction of the cell than such as are found in the anorganic world; this proves that the chief chemical forces, which sustain the bodies of plants and animals, are also not different from those which we find at work in inanimate matter. There is no such thing as a vital matter, any more than a vital force. We have, indeed, succeeded in artificially producing by purely chemical means a great number of organic substances; that seems to point to the possibility of the artificial production of *all* organic compounds which have not yet been produced. The once firmly held traditional

distinction between organic and inorganic chemistry thus breaks down, and is now only maintained on external grounds. Protoplasm, moreover, or the contents of the cells, is a formation of an extremely complicated chemical composition, in which it is not the albumen, as was formerly supposed, but the proteids, that play the chief part. The cell-body is a kind of chemical laboratory in unceasing action, in which different sorts of chemical processes, or a constant metabolism, is maintained. Even irritability, the lowest stage of sensation, constitutes no fundamental difference between the living and the non-living; irritation or stimulation may occur in the latter field just as well as in the former.

One of the greatest and most wonderful problems of science is found in the phenomena of sexuality, or fertilisation by the contact of a male and female germinal matter of, as a rule, microscopic dimensions, and those of heredity. The germinal cells of the higher animals and plants contain, virtually at least, all the properties of the adult animal or the grown plant, and must consequently have fineness of anatomic structure and chemical composition, of which we have no conception, as our power of vision soon finds its limit in these matters. The ova or seeds of various animals and plants may completely resemble each other; yet there must be a fundamental difference in their internal structure. The specific pollen of every flowering plant, for instance, must be already adumbrated in its germinal cells. Millions of human spermatozoa, which seem to be all alike under the microscope, convey all the specific characters of the father to the children, grandchildren, etc., who come from him. The problem of heredity, which has led

to a great number of untenable attempts at explanation, is a cell-problem. But how the impulse of heredity acts on the material parts of the cells may remain for ever an insoluble enigma. We cannot subscribe to the author's own theory of "dominants," which, in his opinion, watch like little gods, or "intelligent forces at second hand," over all the phenomena of the organic world, and direct them according to teleological principles; which are "the hidden chemists of the cells and the invisible builders of animals and plants," and the works of which are "only comparable to the achievements of a many-sided, confident, and extraordinarily high intelligence." Happily the parent of this peculiar theory, which, as so often happens, gives us a word instead of an explanation, or replaces one insoluble problem by another, has no illusions as to its fate; he expresses a fear that the "dominants" will be described as "unsubstantial shadows" or as "a fiction or a host of phantoms." For the rest, these dominants are, according to their author, only instruments in the hands of a "cosmic reason" or "world-soul," which remains an "insoluble problem" in respect of its nature. The latter explanation is certainly not new; it has played, and still plays, an important part in recent religious philosophy under the title of "pantheism." At the same time Reinke admits, inconsistently enough, that he is a theist and an admirer of the mosaic story of creation, which seems indeed to be in harmony with the title of his work.

We may forbear from criticising this sudden lapse from science to theology, since his attitude has long been abandoned both by philosophers and scientists. Modern science rightly resents any introduction of

extra- or super-natural causes on the ground of the law of causality. The assumption of such causes is to philosophic science what arsenic is to man : it dies forthwith, or is dissolved into a useless faith. Finally, let me notice that when Reinke talks of Darwin's opinion as to the creation of the first organisms by divine power he is utterly in error. It is well known that Darwin abandoned in the later editions of his writings the initial hypothesis of one or more ancestral forms created by supernatural influence, and admitted, both explicitly and tacitly, his agreement with the conclusions of other (especially German) writers on this question.

KNOWLEDGE AND EVOLUTION.

IT has recently been proved to evidence once more, by L. Glahn, that all our knowledge is derived in the last resort from the experience conveyed to us through our five senses. In his opinion the purely formal *sciences*, such as geometry, arithmetic, grammar, and logic, can never attain new truths; this can only be done by the knowledge we obtain from external (not internal) sensation. Moreover, of the five senses, only the eye and the organ of touch—the former being taught by the latter—are serviceable in investigating the real world. Nothing exists for us in the great world; hence we must be in a position to touch and see. “*Nihil est in intellectu quod non antea fuit in sensu*”—that is to say, our sense-organs are the sole sources of our knowledge, the only doors by which the outer world can enter into our mental life; and the only valid basis of science, and of all truth, is empiricism or sensism.

In opposition to the idealist philosopher, Kant, who has dominated philosophy for fully a century, and still rules it to some extent, though his success has been, according to Nietzsche, a purely theological one, Glahn maintains that there are no such things as *à priori* forms or faculties of the intelligence. In particular, the idea of *space*, which was erroneously held by Kant to be innate or *à priori*, is, on the

contrary, an outcome of sensitive experience, obtained especially by the sense of touch, as to which no doubt is left by the experiments made on blind-born subjects. At birth the brain, or what are called the associational centres of the brain, which are the seat of the intelligence, are not yet in existence; they are only gradually developed in harmony with the growth of the whole organism. As a result, man's brain is a *tabula rasa* at birth, to be filled with knowledge only by degrees.

The material of thought has to come from without, through the senses, into the brain. Moreover, the eye, which is the chief organ for the perception of the outer world, though it gives only a superficial knowledge, must, as I said, be set into action by the organ of touch, in order to make a useful perception out of a crude sensation of sight; whereas touch suffices of itself to give the idea of space.

Our whole mental life depends in the last resort on the sensations that take place in the ganglionic cells of the brain, the education and further development of which give rise to the intelligence.

That Kant's idea of space is wrong is shown by the experiences with animals, which have the same knowledge of space as men, because they have a similar organisation, and to which Kant, in order to be consistent, would have to ascribe a similar *à priori* capacity for the notion of space. The absurdity of such a proceeding is especially clear when we consider the lowest kinds of animals—for instance, the *monera*—which have no sense but that of touch. Yet these little creatures are able to move about in space, and adapt themselves to it, in spite of their slight organisation and slender measure of intelligence. The sense

of touch is, therefore, quite enough to give the idea of space.

The teaching of Kant leads to complete *illusionism*. For, if space is nothing more than a subjective impression, all that is in space, the whole of the world about us, cannot be other than an impression, and exist only in the mind. In truth, however, the innumerable objects that affect us from without are realities, and not mere bubbles. Their reality stands or falls with space; if that is subjective, all our knowledge is subjective, and devoid of objective certainty. Hence every thinker who takes to the Kantist philosophy must despair of attaining the truth, "provided he is a whole and vigorous man, not a clattering, thinking, or calculating machine."

Moreover, the continuous harmony in which our brain or intelligence finds itself with the outer world is unintelligible on Kant's principles; whilst it is quite natural if we assume that the knowledge of space and of the bodies contained in it is given us by the sense of touch. The same may be said of the agreement of a number of men with each other in their estimate of space; the Kantists can only explain this as a miracle or a "pre-established harmony between the minds of men," whereas there can be no greater abomination to science than a miracle.

Speech, also, so far from being *à priori*, was only invented in the course of prehistoric development. This is proved from the way in which the new-born child learns to speak, or the way in which children in certain circumstances make a language peculiar to themselves, of which Glahn gives many interesting examples. Like children, prehistoric men had no speech originally, but learned by degrees to

communicate with each other, at first by signs and then by sounds, and finally by spoken and written language. The invention of speech, when we go back to the manner of its origin, is by no means so difficult a matter as people are accustomed to suppose. The animals also have a language, with the difference that the animal only uses its sounds for the purpose of expressing its internal feelings (?), whereas man uses his words as the symbols of real and really existing external things.

Just as there is no presentation without an antecedent sense-impression or sensation, so there is no *à priori* thought. All thought arises from experience, without which our reason can draw no conclusion as to real existence and facts. The nucleus of all knowledge is the thought which works with the aid of sense-presentations, since it goes back to the first sources and the foundations of all concepts.

“All true and original knowledge has for its innermost nucleus or its root a sense perception.”

“Reason is of the female sex: it can only give after it has conceived. Of itself it has nothing but the empty forms of procedure. Concepts are not formed until after a number of sense-presentations; they may, therefore, aptly be called presentations of presentations. Empirical perception is the source of all truth and the groundwork of all science; every new truth is a profit of such perception. All thinking is done by images; hence imagination is so necessary an instrument of it, and hence it is that people without imagination never do anything great.”

These simple and easily understood truths have not been able to prevent, in the history of philosophy, the complete severance of the knowing subject from the thing known, and the total denial of the reality of the outer world. And as this extreme view could not be maintained in face of the daily experience and

protest of the healthy human intelligence, it was attempted, in the interest of idealism, to cut through the link that binds subject and object by locating the impressions received from without solely in our own interior, and thus making them play a part independent, to some extent, of outer things.

It cannot, indeed, be denied that we do not know the nature of external things directly, but only in so far as they act upon our perceptive faculties—leaving it an open question whether and in what way there is a direct connection of the two. If we were constrained to suppose that there is no such connection, all our knowledge would be uncertain, or an appearance only, whilst the true nature of things, or the “thing in itself,” would remain eternally unknown and unknowable. We should have nothing to go by but the images within us, of which we could not say whether and to what extent they correspond to the realities of the outer world. All that we ascribe to the things outside of us, such as heat, colour, sound, odour, taste, gravity, solidity, and so on, is only an expression of our sensations; and all that we can say of the nature of outward things is that there are energies or forces working in space in bodily form.

The philosophers who, starting from these data, do not venture to go as far as solipsism, or a Berkeleyan denial of the reality of the outer world, are content to consider the relations of the intellect to the outer world as more or less illusory, or—in other words—to call into question the orderly connection of the two. The nature of things is quite different, or may be quite different, from what it seems to us according to the measure of our feeble cognitive powers. We can never go out of our own skin so as to reach this

eternally-hidden nature of things, but must be content to hold that for true which our sensations reflect of it for us. On this theory we do not perceive the things themselves, but merely their effects on our organs of sense. What we experience as light, for instance, is simply a movement of ether affecting our organ of vision. What we perceive as sound is only the effect of the beating of air waves on our auscultory organ, and so on. But that which produces all these effects remains unknown to us. It is the famous veil of Maja, which is, according to Indian theories, cast over the eyes of all mortals, and only allows them to perceive a world of which one cannot say whether it exists or no, or how it exists.

This veil of Maja has been lifted, in part at least, by the modern theory of evolution, which has shown that man is not a being alien to nature and independent of it, but a part and product of it. Hence the world of reality and the world of consciousness cannot be, as idealistic and spiritistic philosophers affirm on the strength of the above considerations, two completely heterogeneous and entirely different worlds; they must be in a necessary and orderly relation to each other. If older philosophers introduce man ready-made, and equipped with all his faculties, into the world, and oppose him to it, and make him regard it from this *à priori* point of view as a world quite alien to him, it is pardonable that they should come to such extreme conclusions, turning the world upside down, as it were, as that of the complete and fundamental difference of subject and object. But since evolution has cast its wondrous light on the origin and development of man, in respect of both body and mind, and on his close connection with

nature, the relation of the two must be judged by a very different standard. For if man is a product of nature like all its other products, his relation to his environment must also be thoroughly natural and orderly ; or, in other words, the outer world of nature and the inner world of mind must stand in a necessary and orderly internal relation to each other. This connection is brought about by our sense-organs, of which it has been shown above that they are the only doors by which a knowledge of the outer world can penetrate to our interior. And comparative anatomy has proved to evidence that these organs are not an unmerited gift of heaven to a ready-made man, but have been developed out of almost invisible rudiments to their present formation by means of countless intermediate stages and enormous periods of time.

The sense-organs arise in much the same way in the case of man and the other animals—namely, as parts of the external covering of the body or the outer skin (epidermis). The outer skin is the original and universal sense-organ, the higher sense-organs gradually differentiating from it by retiring more or less into the protected interior of the body. But in the case of many of the lower animals—the worms, for instance—they remain in the epidermis throughout life ; just as animals and men in general have in the earliest stages of their development only one sense-organ, or the sense of touch. The eye, for example, the most highly developed of our sense-organs (which suffers, nevertheless, from quite a number of defects), is only represented in its earliest beginning by small accumulations of red or violet pigment-cells of the skin at the foremost part of the body of the lowest

animals; at a higher stage it appears as a simple nerve, sensitive to light, lying under the skin. But how much its rise and its further development are determined by the action of external agencies, especially light, is seen by the example of the blind worms, or of the large eyes of the marine animals that live in a perpetual twilight at the bottom of the sea. Where there is no light the eye cannot be formed; whence it follows that objective radiation or vibration and subjective sensation have a definite relation of affinity or origin. Even Goethe was well aware of this when he enunciated the profound thesis: "If the eye had no affinity for the sun, it would never see it." The great poet thus enunciated the relation better than modern writers, who derive the eye from sight and through sight. There is no sight without an eye or a substitute for one; how, then, could the eye come from seeing? It is just the reverse; it is the natural operation of light or the vibrations of ether that have gradually developed the organ of sight out of the living substance by their action on it.

The same must be said of all the other sense-organs: they are, or were originally as I said, merely parts of the epidermis, in which sensitive nerves spread out, and which have developed in the course of millions of years, by exercise, division of labour, adaptation, and heredity, to their present degree of construction—a process that may be proved to-day in all its stages (abbreviated) from the simple epidermic-cells of hatched chickens.

All this leaves no doubt possible that the senses are the outcome of a sort of reciprocal action between the living substance and the influences of outer nature

that affect it. From this it may be concluded with equal confidence that there are perceptive organs to correspond to all the chief or more important movements in nature which affect our sensitive life ; or that, in the course of the many millions of years which preceded the actual animals and men, the natural development of sense-life could not proceed without calling into existence perceptive organs to correspond to the movements of nature. We are further justified in concluding, in opposition to the ideologists, that, if such organs are not found, the hypothetical corresponding movements in nature are either entirely non-existent, or are so feeble in their action on the living substance that they were unable to set up in it a corresponding reaction. If, therefore, we have no sense, or no direct perceptive organ, for the impressions of electricity, magnetism, chemical affinity, and so on, this must be explained in the sense that the direct action of certain natural forces on the living substance was not strong enough to create, with the aid of natural selection, a special organ for them, in addition to that of general sensation. This general sensation, especially the sense of touch, suffices to give a human being an acquaintance with the chief agencies of the outer world, as is proved by the cases of the Americans, Laura Bridgeman and Julia Brace. But how great the influence of the outer world—the environment, want, and so forth—is on the development of sense-action is shown by the almost incredible development of the sense of smell in animals, or the delicate hearing of certain insects which communicate with each other by rasping noises that are quite imperceptible to the human ear, or the sixth sense of fishes, detected by

recent observations, which enables them to appreciate the chemical composition of water and recognise hurtful additions. The direct force of the outer circumstances of life is seen still more clearly in the deep-sea fishes which are provided with illuminating organs indispensable for catching their prey in the eternal darkness of the depths of the ocean.

When it is asserted, therefore, by the idealist that our world-picture is purely subjective and independent of objectivity, or that other senses or a different organisation would show us a world quite different from the present one, we have a double misunderstanding. In the first place, we cannot really have other senses than those we actually have, or cannot be constructed otherwise than we actually are; and the same forms of sense-organs must be identical all over the world under circumstances that are practically the same.

If the world were really constituted altogether differently from what we perceive it to be, and if our world-picture did not correspond to reality, but were a mere subjective presentation, this would only be possible, as I said, on the theory that the creation of man was purely subjective and alien to all external relations, and that he was compelled to look out through the glasses of an organisation imposed on him arbitrarily upon an utterly alien world. But this is the reverse of the truth, as we have learned from the investigations as to the age and origin of the human race in conjunction with the teaching of evolution; it has been proved that there is a close and indissoluble connection between man and the world. Moreover, no increase in the number of our senses, to six, seven, eight, or more, would alter the

matter. We should not find the world different from what we do now, but perhaps be able to perceive directly movements in nature which we now only learn by observation and experiment. In other words, our direct world-picture would probably be richer and more comprehensive, but not substantially different from what it is. Whether the man of the future will develop, by way of further evolution, a more complicated sense-system or so sensitive a nervous system that he will be able to perceive directly natural movements, the presence of which is not yet known to us, or is only deducible from their effects, it is impossible to say. But such an event would prove, as I said, not a subversion, but an expansion, or, more properly, a relief of our knowledge. The world would not on that account be changed, the hitherto recognised laws of nature would not lose their validity, and the ancient saying of the philosopher Protagoras, that man is the measure of all things, would retain all its force. This would, at least, be the case as far as the planet we inhabit is concerned; we might grant that on other planets—provided they are inhabited or habitable—other physical relations may have brought about a change in the organic features of their animal and human inhabitants, or that other physical conditions may possibly have caused differently formed or differently adapted sense-organs. We may unhesitatingly grant this possibility, confirmed as it is by the above-mentioned circumstance, that man's sense-energies must be regarded as the gradual outcome of an adaptation of the life-process to the environment, without any detriment to the aforesaid conclusion.

If, then, it must be granted in face of all this that the formation of the senses is in necessary causal

connection with the physico-chemical conditions of the outer world, it must be further admitted that our various sensations are evoked by definite material movements in the outer world opposed to them. Even if—as cannot be denied—these movements of the outer world acquire in our sense-organs a number of properties which we ascribe to them; even if sounds, colours, odours, or even sensations of heat, light, taste, pressure, and so on, are only additions of our subjective ego to the objective outer world, and the latter, when we strip it of those additions, should appear to be only a collection or sum of countless atoms or tiny particles of matter vibrating to and fro in the most varied forms; still these movements or things are no less real on that account, and they form the indispensable foundation or material of all our knowledge. What appears to us as a blue colour is caused by the vibration of the particles of ether at the rate of about 700,000,000,000,000 per second, whilst a red colour means vibration at the rate of 500,000,000,000,000 per second. If the ethereal vibrations are slower, they cause the feeling of heat. Our ear has the sensation of C in the third octave when the molecules of the air vibrate 264 times to the second, whilst if the vibration be increased one and a half times we have the harmonic note of the fifth, and if it be doubled we have the octave. The different conditions in which we find water, as solid ice, fluid, and aqueous vapour, are merely different states of motion of the same molecules of water. All ultimate phenomena consist of movements of larger or smaller masses; but every movement, be it ever so great or small, has a real and objective truth for us.

Indeed, even the philosophers of the Middle Ages (Hobbes and Locke) and of ancient times (Aristippus, Epicurus, and the Stoics) saw this very clearly when they distinguished between the sensible qualities of things, or the sensations of the organised animal body, and the things themselves, but added that behind the things of the phenomenal world there was nothing further to seek. Hence it is quite wrong to regard this distinction as a new discovery of science, especially of the physiology of the sense-organs; the simplest reflection, without any scientific culture, suffices for drawing a distinction between the sensation and the influence that caused it. It is only the further conclusion, that everything is more or less an illusion of sense, and that the world is quite different from what we perceive it to be, that is without justification; and the ever-recurring charge made against philosophic realism, that it believes with a naïve infatuation in the truth or reality of what we know, though there can be no object without a knowing subject, is quite unfounded. If, as the idealists affirm, sensation is a purely subjective state, and if "the naïve belief in the reality of the phenomenal world" must be given up, as F. A. Lange declares in his over-praised *History of Materialism*, there is no true knowledge, no objective truth, no science, any longer possible; we move like dreamers or somnambulists in a world that is foreign or unknown to us, as to the true nature of which we shall never (except, perhaps, on the spiritist theory, at death, or in the refined ecstasies of spiritistic mediums) be informed. It is, as I have already shown, inconceivable or impossible that the world should be essentially other than as man conceives it, because he is himself only a part of this

world, or a product of nature, and because, if the world were different, he himself would be different. An essential or fundamental difference between the two is unthinkable; though there may be isolated hallucinations of sense, which we have to correct by science and reflection. But whoever thinks of forging weapons against sense-perception in general from these isolated hallucinations must, on the same principle, deduce the groundlessness of thought from its errors. Our sensations, moreover, which only become sense-perceptions and offer material for further elaboration to the intelligence through the action of the brain, are not, as we have seen, something complete in itself, and independent of the outer world, but are in every case caused by very definite and very varied movements of the outer world—movements which must have a definite and orderly relation to those which take place within us. For, as the distinguished scientist and natural philosopher, Nägeli, says, in complete accord with the views here advanced :—

“The agreement of the sense-perception and the internal mental operation with the affecting object consists, for the monism of the finite world, in the fact that the same forces are operative in us, and the same laws hold dominion, as in the things without us. Hence the picture which our senses give us cannot falsify the object, and the further elaborations which it undergoes in judgment *must bring it nearer and nearer to the nature of the object*. . . . The sense-perceptions which we receive from without and elaborate within us find a ground quite conformable to their nature, from which necessarily arise the presentations of their real properties, their space, time, and causal features. . . . The apparent *à priori* character of general ideas arises from the circumstance that the same order and the same logic hold sway in the subject, as a part of the whole, as in the universe at large.”

Even so academic a philosopher as E. Zeller (*On the Theory of Knowledge*) has to admit that it by no

means follows from the subjective forms of thought that things in themselves are not as we conceive them. Our thought-forms can, and must, be of a nature to afford us a correct knowledge of things, since there is only one law and one order of nature from which the things themselves arise. And would not all our efforts to bring into an intelligible connection by investigation and knowledge the most important points of the phenomenal world be of no avail, if we had reason to suppose that this phenomenal world were itself in unintelligible relation to an unknown and absolutely unknowable something? "The thing in itself is but the shadow of our thought" (Brochard), or, as Wiessner says (in *The Atom*), "a fiction which owes its origin to the delusion that there is something apart at the back of things, hidden by them, and so inaccessible to our knowledge." In truth, there is something behind everything—namely, something else. But this is not *beyond*, but *on this side*, of the limit; not extra- or transmundane, but a part of the knowable reality.

Kant himself, who has given persistence to the whole unprofitable controversy by his famous distinction between the noumenon and the phenomenon, or the "appearance" and "the thing in itself," says in his *Criticism of Pure Reason*, with remarkable candour: "What the things in themselves may be I do not know, and do not need to know, because a thing can never come home to me otherwise than in appearance." Pliny, the ancient Roman scholar, saw this almost more clearly when he wrote the notable words:—

"Folly—it is indeed folly to go forth from the world, and, as if we already knew everything in it, to seek what is beyond; just as if a

man were too busy himself about the measurement of a thing, knowing not his own, or as if the human mind could see what the world does not contain."

The historical occurrence which prevented this simple advice of classic antiquity from bearing fruit in subsequent centuries is well known. More than a thousand years had to elapse before men began to reflect on themselves and gradually to understand their true relation to nature. But it was reserved for our own day to bring these principles to maturity by the penetration into the province of mental science of the idea of evolution derived from the material world. It is true that the victory of the new view is still far from won, and will not be assured until the after-effect of the hitherto dominant and erroneous ideas of the relation of man and the world shall have gradually lost its force with the lapse of time. Many a hard intellectual fight must yet be fought before the tyranny of these ideas will be effectually shattered. It certainly cannot be said that the spirit of the time is favourable to such a victory, in spite of the splendid progress of human knowledge and capacity in the last century. On the contrary, reactionary influences outweigh progressive at the moment in science, art, literature, and life. But that this will not always be the case is assured by the experience of history, which teaches that valleys alternate with hills in the life of the mind as in that of nature and of politics. But when once the belief in evolution has replaced the earlier idea of creation in educated minds, we shall see without delay the reconciliation of the inner and outer, of thought and reality, of man and the world, of nature and mind, in a monistic theory of the world.

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